

ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR FCC CERTIFICATION

Test Report No. : E064R-040

AGR No. : A064A-039R

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. : P3HSP4

Model Name : SP4

Serial number : N/A

Total page of Report : 17 pages (including this page)

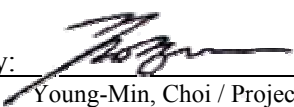
Date of Incoming : March 06, 2006

Date of Issuing : April 18, 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.

CONTENTS

	PAGE
1. VERIFICATION OF COMPLIANCE.....	3
2. GENERAL INFORMATION.....	4
2.1 PRODUCT DESCRIPTION.....	4
2.2 MODEL DIFFERENCES.....	4
2.3 RELATED SUBMITTAL(S) / GRANT(S)	4
2.4 TEST SYSTEM DETAILS	4
2.5 TEST METHODOLOGY	4
2.6 TEST FACILITY	4
3. SYSTEM TEST CONFIGURATION.....	5
3.1 JUSTIFICATION	5
3.2 EUT EXERCISE SOFTWARE.....	5
3.3 CABLE DESCRIPTION FOR THE EUT	5
3.4 EQUIPMENT MODIFICATIONS	5
3.5 CONFIGURATION OF TEST SYSTEM	6
3.6 ANTENNA REQUIREMENT	6
4. PRELIMINARY TEST.....	6
4.1 AC POWER LINE CONDUCTED EMISSION TEST	6
4.2 RADIATED EMISSION TEST	6
5. FINAL RESULT OF MEASUREMENT	7
5.1 CONDUCTED EMISSION TEST.....	7
5.2 RADIATED EMISSION TEST (WITHIN THE PERMITTED 200 KHZ BAND)	9
5.2.1 The power of the EUT: AC/DC Adaptor.....	9
5.2.2 The power of the EUT: Car Adaptor.....	10
5.3 RADIATED EMISSION TEST (OUTSIDE OF THE SPECIFIED 200 KHZ BAND).....	11
5.3.1 The power of the EUT: AC/DC Adaptor.....	11
5.3.2 The power of the EUT: Car Adaptor.....	12
5.4 BANDWIDTH OF THE OPERATING FREQUENCY	13
6. FIELD STRENGTH CALCULATION.....	16
7. LIST OF TEST EQUIPMENT.....	17

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
- FCC ID : P3HSP4
- MODEL NO/NAME : SP4
- SERIAL NUMBER : N/A
- DATE : April 18, 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.

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. 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 an AC/DC Adaptor or Car Adaptor
TX FREQUENCY RANGE	88.1 MHz ~ 107.9 MHz (range into 200 KHz Step)
NUMBER OF LAYERS	6 Layers: Main Board, 4 Layers: Cradle Board, 2 layers: Key Board
EXTERNAL CONNECTOR	DC In, Antenna In, Audio Out, FM Out, AUX In

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.	P3HSP4	Digital Satellite Radio (EUT)	-
LT 416	LEADER	N/A	Pattern Generator	EUT
SMS-015N	SUNGIL PRECISION	N/A	Speaker	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 April 04, 2003. (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 DV REV.E	N/A
Function Key Board	KI RYUNG ELECTRONICS CO., LTD.	SP4 SUB KEY REV.E	N/A
Cradle Board	KI RYUNG ELECTRONICS CO., LTD.	SP4 CAR CRADLE REV.E	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. 107.9 MHz was measured as the highest output power. Data from this channel was determined to be worst case.

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	Pattern Generator
DC In	N	EUT END	EUT END	1.2	AC/DC Adaptor or Car Adaptor
FM Out	N	N	EUT END	1.2	-

3.4 Equipment Modifications

-. None

3.5 Configuration of Test System

Line Conducted Test: The EUT was connected to AC/DC adaptor and AC/DC adaptor was connected to LISN. All supporting equipments were connected to another LISN. Preliminary Power line Conducted Emission test was performed by using the procedure in ANSI C63.4: 2003 7.2.3 to determine the worse operating conditions.

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.

3.6 Antenna Requirement

For intentional device, 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:

FM transmitter antenna of the EUT is fixed inside the EUT, no consideration of replacement by the user.

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)
Transmit the RF Signal continuously	X

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 Conducted Emission Test

Humidity Level : 39 %

Temperature: 20 °C

Limits apply to : FCC CFR 47, PART 15, SUBPART C, SECTION 15.207 (a)

Type of Test : Low Power Communication Device Transmitter

Result : PASSED BY -6.54 dB at 0.18 MHz under peak mode

EUT : Digital Satellite Radio

Date: March 15, 2006

Operating Condition : Transmit RF signal.

Detector : CISPR Quasi-Peak (6 dB Bandwidth: 9 kHz)

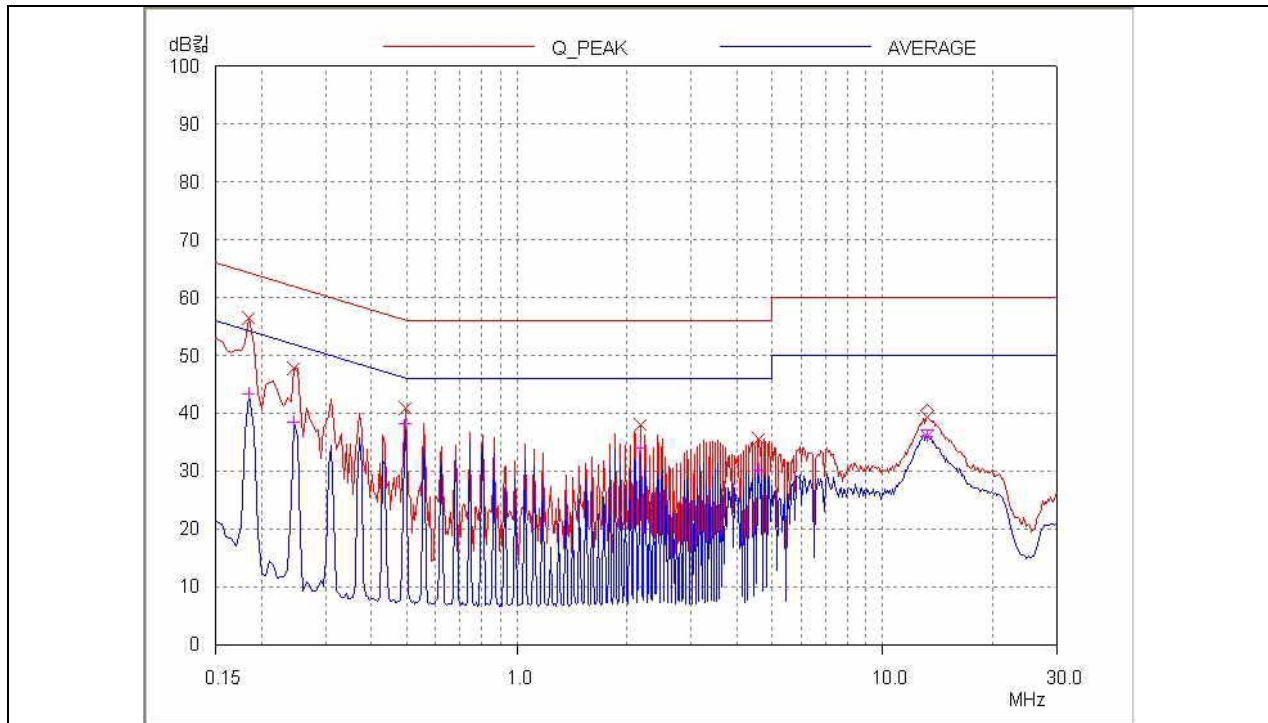
Frequency (MHz)	Line	Peak (dBuV)		Margin (dB)
		Emission level	Q.P Limits	
0.18	N	57.72	64.26	-6.54
0.25	N	50.11	61.76	-11.65
0.49	H	40.90	56.08	-15.18
0.56	N	37.73	56.00	-18.27
2.16	H	37.93	56.00	-18.07
4.57	H	35.55	56.00	-20.45
Frequency (MHz)	Line	Average (dBuV)		Margin (dB)
		Emission level	Limits	
0.18	N	42.53	54.26	-11.73
0.25	N	37.27	51.76	-14.49
0.49	H	38.15	46.08	-7.93
2.16	H	33.99	46.00	-12.01

Line Conducted Emission Tabulated Data

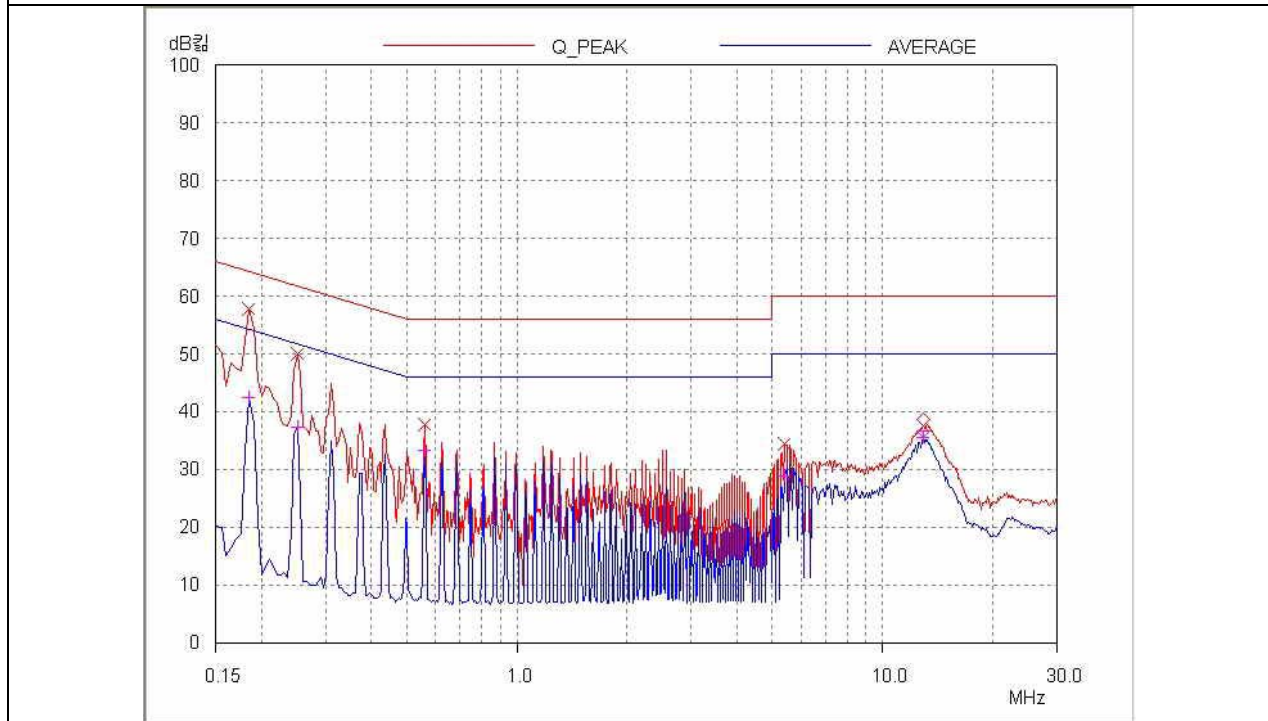
Remark : "H": Hot Line, "N": Neutral line

See next page for an overview sweep performed with peak and average detector.

Tested by: Sue-Young, Lee/ Test Engineer



HOT LINE



NEUTRAL LINE

5.2 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.

5.2.1 The power of the EUT: AC/DC Adaptor

Humidity Level : 41 %

Temperature: 17 °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 -2.64 dB at 97.90 MHz

EUT : Digital Satellite Radio

Date: March 28, 2006

Operating Condition : Transmit the RF signal.

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	32.00	Peak	H	7.89	1.74	41.63	48.00	-6.37
88.10	35.60	Peak	V	7.89	1.74	45.23	48.00	-2.77
97.90	33.60	Peak	H	9.66	1.90	45.16	48.00	-2.84
97.90	33.80	Peak	V	9.66	1.90	45.36	48.00	-2.64
107.90	32.10	Peak	H	11.07	1.90	45.07	48.00	-2.93
107.90	29.30	Peak	V	11.07	1.90	42.27	48.00	-5.73

Radiated Emission Tabulated Data

Remark: Per 15.31(m), three channels (near top, near middle and near bottom) were tested because the EUT's frequency range is more than 10 MHz.

Tested by: Sue-Young, Lee/ Test Engineer

5.2.2 The power of the EUT: Car Adaptor

Humidity Level : 41 %

Temperature: 17 °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 – 5.77 dB at 88.10 MHz

EUT : Digital Satellite Radio

Date: March 28, 2006

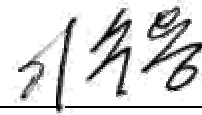
Operating Condition : Transmit the RF signal.

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	30.92	Peak	H	7.89	1.74	40.55	48.00	-7.45
88.10	32.60	Peak	V	7.89	1.74	42.23	48.00	-5.77
97.90	25.90	Peak	H	9.66	1.90	37.46	48.00	-10.54
97.90	29.30	Peak	V	9.66	1.90	40.86	48.00	-7.14
107.90	27.60	Peak	H	11.07	1.90	40.57	48.00	-7.43
107.90	27.80	Peak	V	11.07	1.90	40.77	48.00	-7.23

Radiated Emission Tabulated Data

Remark: Per 15.31(m), three channels (near top, near middle and near bottom) were tested because the EUT's frequency range is more than 10 MHz.



Tested by: Sue-Young, Lee/ Test Engineer

5.3 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.

5.3.1 The power of the EUT: AC/DC Adaptor

Humidity Level : 41 % Temperature: 17 °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 -3.88 dB at 815.56 MHz

EUT : Digital Satellite Radio Date: March 28, 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)
40.26	17.80	V	14.55	1.32	33.67	40.00	-6.33
61.50	22.70	V	7.08	1.43	31.21	40.00	-8.79
125.36	13.70	V	13.09	2.11	28.90	43.52	-14.62
150.60	12.80	V	14.64	2.31	29.75	43.52	-13.77
815.56	12.60	V	22.37	7.17	42.14	46.02	-3.88
815.56	11.07	H	22.37	7.17	40.61	46.02	-5.41

Tested by: Sue-Young, Lee/ Test Engineer

5.3.2 The power of the EUT: Car Adaptor

Humidity Level : 41 %

Temperature: 17 °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 -6.60 dB at 41.25 MHz

EUT : Digital Satellite Radio

Date: March 28, 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)
41.25	17.80	V	14.20	1.40	33.40	40.00	-6.60
60.48	22.70	V	7.26	1.41	31.37	40.00	-8.63
125.00	13.70	V	13.07	2.10	28.87	43.52	-14.65
143.40	12.80	V	14.37	2.37	29.54	43.52	-13.98
170.20	15.28	V	15.28	2.41	32.97	43.52	-10.55
816.00	7.50	H	22.38	7.17	37.05	46.02	-8.97

Tested by: Sue-Young, Lee/ Test Engineer

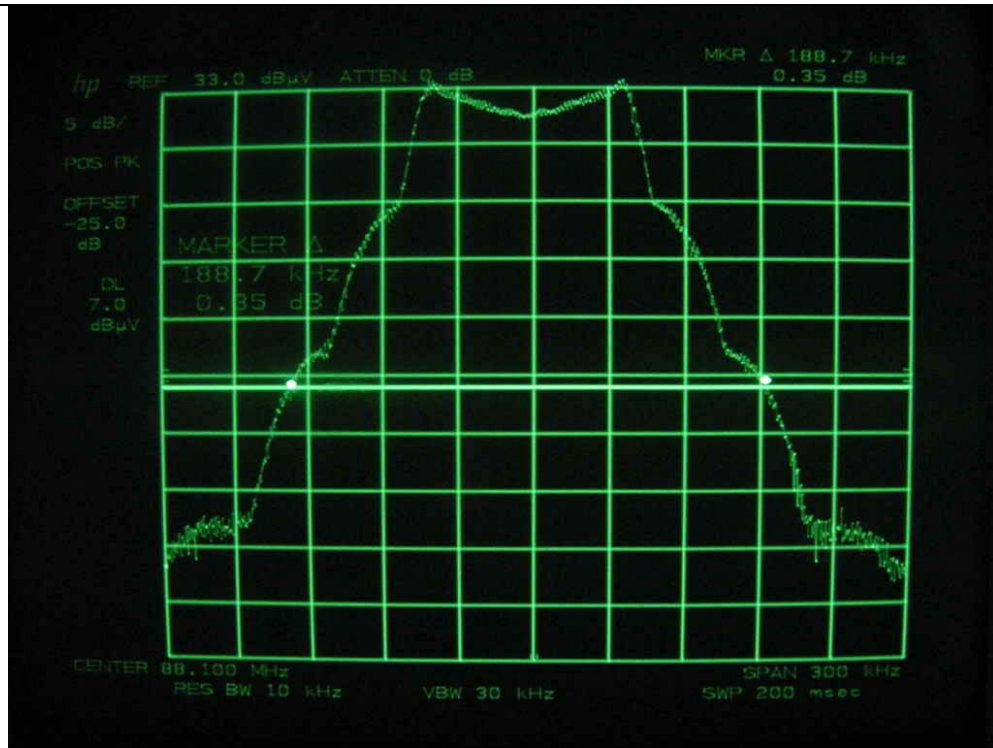
5.4 Bandwidth of the operating frequency

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

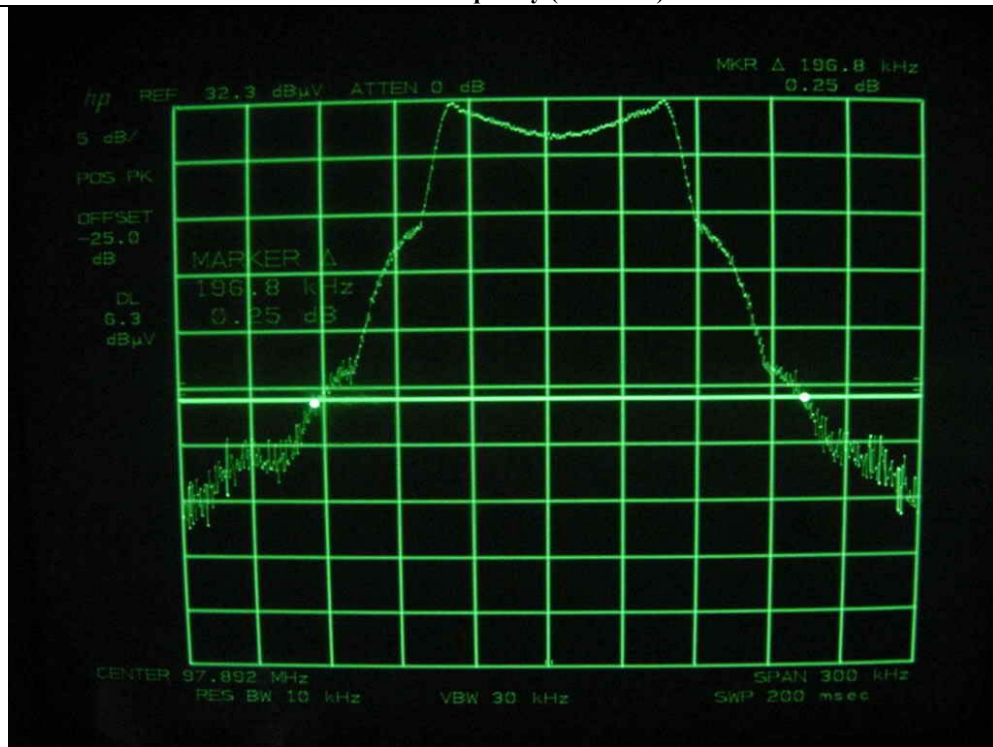
EUT : Digital Satellite Radio Date: March 28, 2006
Operating Condition : Transmit the RF signal.
Minimum Resolution
Bandwidth : 10 kHz
Remark : Refer to test data in next page.



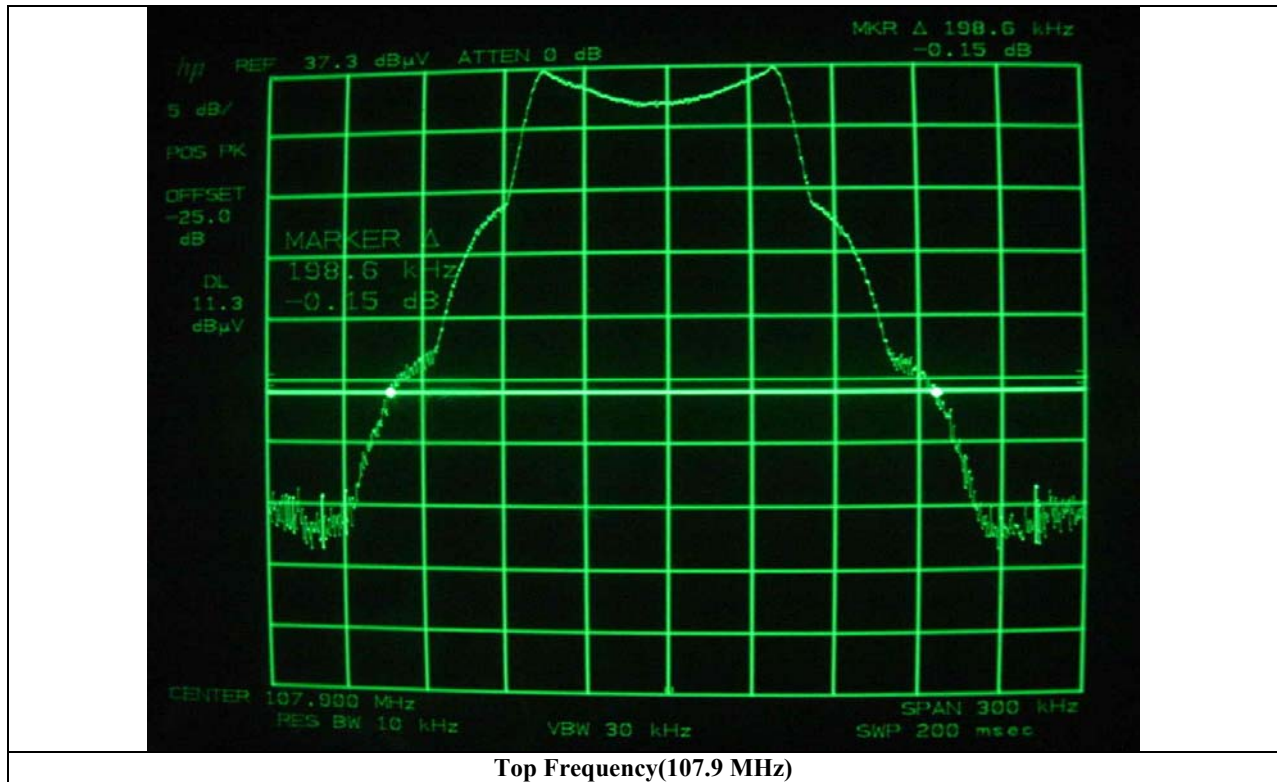
Tested by: Sue-Young, Lee/ Test Engineer



Bottom Frequency (88.1MHz)



Middle Frequency (97.9MHz)



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/05	12MONTH	■
3.	Spectrum analyzer	HP	8566B	3407A08547	JUL/05	12MONTH	
4.	Spectrum analyzer	HP	8568B	3109A05456	APR/05	12MONTH	■
5.	RF preselector	HP	85685A	3107A01264	APR/05	12MONTH	■
6.	Quasi-Peak Adapter	HP	8574B	2811A01432	APR/05	12MONTH	■
7.	TRILOG Broadband Antenna	Schwarzbeck	VULB9163	VULB9163 166	APR/05	12MONTH	
8.	Biconical antenna	EMCO	3110	9003-1121	FEB/06	12MONTH	
		Schwarzbeck	VHA9103	91031852	FEB/06		■
9.	Log Periodic antenna	EMCO	3146	9001-2614	FEB/06	12MONTH	
		Schwarzbeck	9108-A(494)	62281001	FEB/06		■
10.	LISN	EMCO	3825/2	9109-1867	JUL/05	12MONTH	■
				9109-1869	JUL/05		
		Schwarzbeck	NSLK 8126	8126-404	AUG/05		■
11.	Position Controller	HD GmbH	HD100	N/A	N/A	N/A	■
12.	Turn Table	HD GmbH	DS420S	N/A	N/A	N/A	■
13.	Antenna Master	HD GmbH	MA240	N/A	N/A	N/A	■