ELECTROMAGNETIC EMISSION COMPLIANCE REPORT FOR FCC CERTIFICATION

Test Report No.	**: E068R-021**
AGR No.	**: A067A-114**
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.	**: P3HNSPHR1**
Model Name	**: SP-R1**
Serial number	**: N/A**
Total page of Report	**: 19 pages (including this page)**
Date of Incoming	**: July 20, 2006**
Date of Issuing	**: August 17, 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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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)

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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 : P3HNSPHR1

-. MODEL NAME : SP-R1

-. SERIAL NUMBER : N/A

-. DATE : August 17, 2006

DEVICE TYPE	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	Yes
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.

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2. GENERAL INFORMATION

2.1 Product Description

The KI RYUNG ELECTRONICS CO., LTD., Model SP-R1 (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)	Main Board : 7.3728 MHz and 7.6 MHz PULASR Module: 12.288 MHz, 7.3728 MHz and 30 MHz
POWER REQUIREMENT	DC 12V 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	Main Board : 6 Layers, PULASR RF Module Board : 8 Layers
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
SP-R1	KI RYUNG ELECTRONICS	P3HNSPHR1	Digital Satellite Radio(EUT)	-
DSA-0131F-12 US 12	DVE	N/A	AC/DC Adaptor	EUT
JSGSRA733	SIRIUS	N/A	Satellite Radio 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)

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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	SP-R1 REV.3(X3)	N/A
RF Module Board	KI RYUNG	Jupiter 2.5D REV.O	N/A
Cradle Board	KI RYUNG	X3 CRADLE REV.C	
Adapter Board	N/A	N/A	N/A

3.2 EUT exercise Software

The Model, SP-R1 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. 88.1 MHz was measured as the highest output power. Data from this channel was determined to be worst case.

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	EUT END	EUT END	1.2	AC/DC Adaptor or Car Adaptor
FM Out	N	N	EUT END	1.2	-
Antenna In	N	N	EUT END	1.2	External Antenna

3.4 Equipment Modifications

It is acknowledged by Ki Ryung Electronics Co., Ltd.. that the modifications below will be installed to the Model XTR3 in order to comply with FCC Rules as a Low Power Communication Device Transmitter.

1. R28(510ohm) & R410(510ohm) change to 1100ohm.
2. R409(510ohm) change to 1200ohm.
3. C431(8.2pF) change to 7pF & L405(100nH) change to 82nH.

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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

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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 Conducted Emission Test

Humidity Level : 49 % Temperature: 21 °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 –9.83 dB at 0.21 MHz under peak detector mode

EUT : Digital Satellite Radio Date: August 07, 2006

Operating Condition : Transmit the RF signal.

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

Frequency (MHz)	Line	Peak (dBuV)		Margin (dB)
		Emission level	Q.P Limits	
0.21	H	53.58	63.41	-9.83
0.45	N	42.91	56.97	-14.06
0.46	H	43.41	56.69	-13.28
0.67	N	41.84	56.00	-14.16
2.13	N	41.77	56.00	-14.23
4.38	N	42.33	56.00	-13.67
Frequency (MHz)	**Line**	**Average (dBuV)**		**Margin (dB)**
		Emission level	**Limits**	
0.21	H	27.52	53.41	-25.89
0.45	N	27.14	46.97	-19.83
0.46	H	24.22	46.69	-22.47
0.67	N	22.31	46.00	-23.69
2.13	N	21.36	46.00	-24.64
4.38	N	21.63	46.00	-24.37

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-Yong, Lee / Test Engineer

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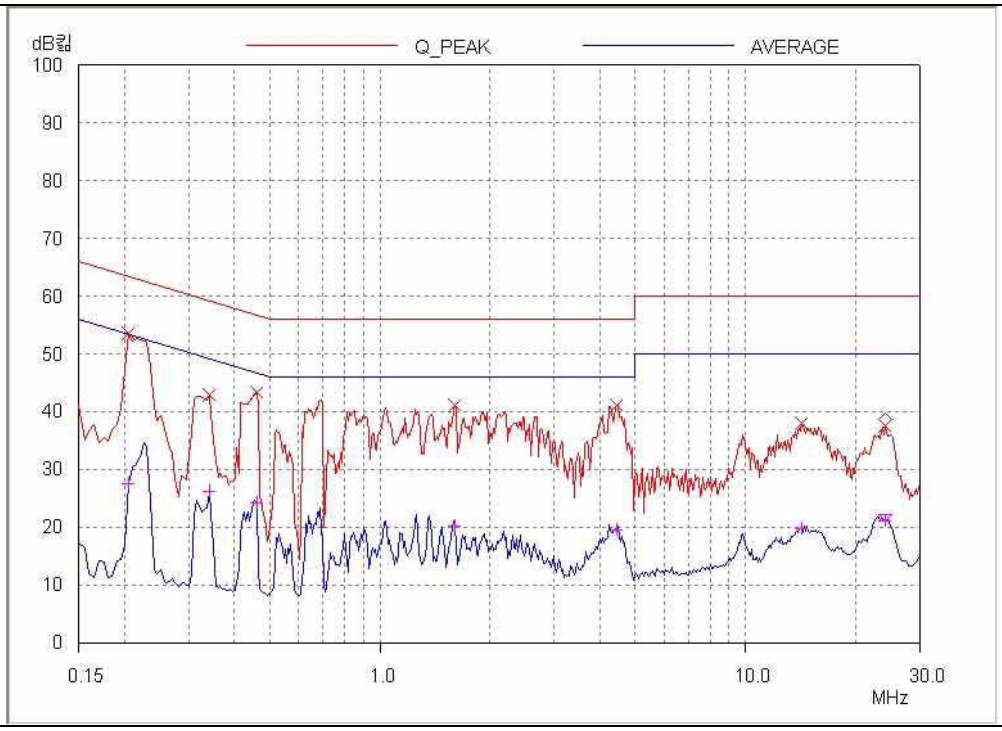
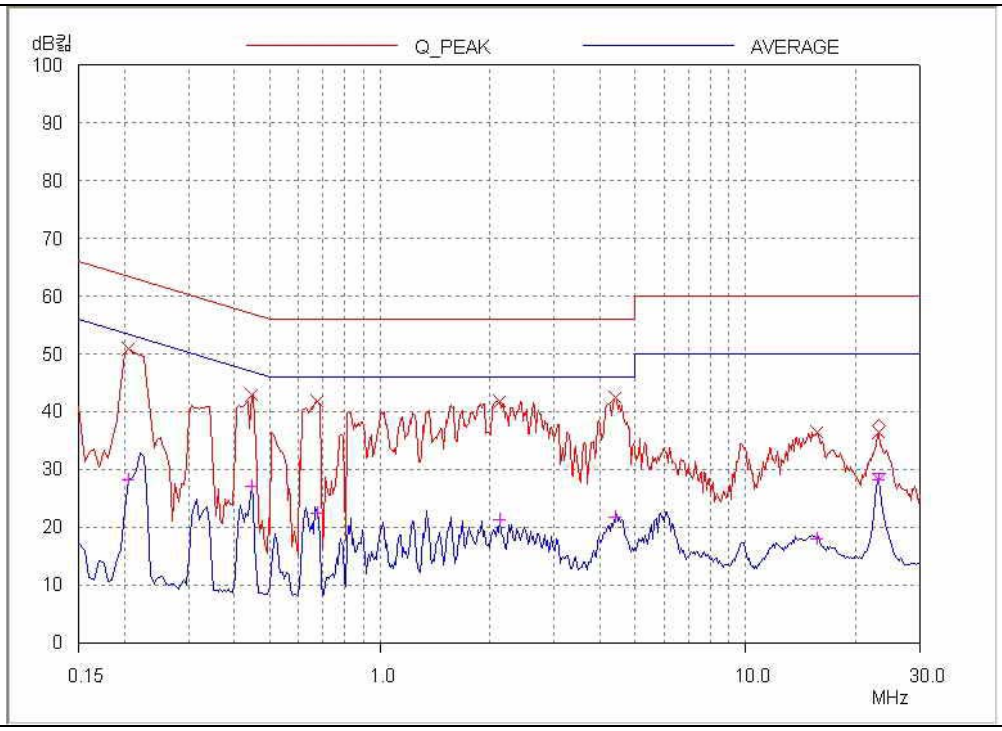


HOT LINE



NEUTRAL LINE

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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 Operating Condition: AC/DC Adaptor Mode

Humidity Level : 47 % Temperature: 26 °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 –3.27 dB at 88.10 MHz

EUT : Digital Satellite Radio Date: August 04, 2006

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)
88.10	33.50	Quasi-Peak	H	7.89	1.74	43.13	48.00	-4.87
88.10	35.10	Quasi-Peak	V	7.89	1.74	44.73	48.00	-3.27
97.90	25.70	Quasi-Peak	H	9.66	1.90	37.26	48.00	-10.74
97.90	22.10	Quasi-Peak	V	9.66	1.90	33.66	48.00	-14.34
107.90	20.90	Quasi-Peak	H	11.07	1.90	33.87	48.00	-14.13
107.90	18.10	Quasi-Peak	V	11.07	1.90	31.07	48.00	-16.93

Radiated Emission Tabulated Data

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

Tested by: Sue-Young, Lee/ Test Engineer

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5.2.2 Operating Condition: Car Adaptor Mode

Humidity Level : 47 % Temperature: 26 °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 –2.87 dB at 88.10 MHz

EUT : Digital Satellite Radio Date: August 04, 2006

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)
88.10	31.00	Quasi-Peak	H	7.89	1.74	40.63	48.00	-7.37
88.10	35.50	Quasi-Peak	V	7.89	1.74	45.13	48.00	-2.87
97.90	28.10	Quasi-Peak	H	9.66	1.90	39.66	48.00	-8.34
97.90	25.30	Quasi-Peak	V	9.66	1.90	36.86	48.00	-11.14
107.90	18.10	Quasi-Peak	H	11.07	1.90	31.07	48.00	-16.93
107.90	21.00	Quasi-Peak	V	11.07	1.90	33.97	48.00	-14.03

Radiated Emission Tabulated Data

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

Tested by: Sue-Young, Lee/ Test Engineer

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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 Operating Condition: AC/DC Adaptor Mode

Humidity Level : 47 % Temperature: 26 °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 –13.72 dB at 54.50 MHz

EUT : Digital Satellite Radio Date: August 04, 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)	Pol.	Ant. (dBuV/m)	Cable (dB)	Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
54.50	15.70	H	9.17	1.41	26.28	40.00	-13.72
141.20	11.40	V	14.79	2.39	28.58	43.52	-14.94
223.10	10.60	V	16.56	2.98	30.14	46.02	-15.88
252.90	9.80	H	17.02	3.41	30.23	46.02	-15.79
401.50	10.10	H	15.50	4.40	30.00	46.02	-16.02
481.40	8.40	V	17.05	5.13	30.58	46.02	-15.44

Tested by: Sue-Young, Lee/ Test Engineer

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5.3.2 Operating Condition: Car Adaptor Mode

Humidity Level : 47 % Temperature: 26 °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 –13.22 dB at 55.10 MHz

EUT : Digital Satellite Radio Date: August 04, 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)	Pol.	Ant. (dBuV/m)	Cable (dB)	Amp. (dBuV/m)	Limit (dBuV/m)	Margin (dB)
55.1	16.40	H	8.98	1.40	26.78	40.00	-13.22
64.1	17.10	V	6.64	1.48	25.22	40.00	-14.78
130.4	10.40	V	13.90	2.21	26.51	43.52	-17.01
200.1	10.30	H	15.87	2.80	28.97	43.52	-14.55
252.4	9.40	H	16.99	3.41	29.80	46.02	-16.22
480.8	8.20	V	17.04	5.12	30.36	46.02	-15.66

Tested by: Sue-Young, Lee/ Test Engineer

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5.4 Bandwidth of the operating frequency

Humidity Level : 47 % Temperature: 26 °C

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

Result : PASSED

EUT : Digital Satellite Radio Date: August 04, 2006

Operating Condition : Transmit the RF signal.

Minimum Resolution Bandwidth : 10 kHz

Remark : Refer to test data in next page.

Operating Condition	Frequency (MHz)	Measured Value (kHz)	Limit (kHz)	Margin (kHz)
AC/DC Adaptor Mode	88.1	156.9	200	-43.1
	97.9	171.3		-28.7
	107.9	161.1		-38.9

Operating Condition	Frequency (MHz)	Measured Value (kHz)	Limit (kHz)	Margin (kHz)
Car Adaptor Mode	88.1	156.9	200	-43.1
	97.9	170.4		-29.6
	107.9	161.7		-38.3

Tested by: Sue-Young, Lee/ Test Engineer

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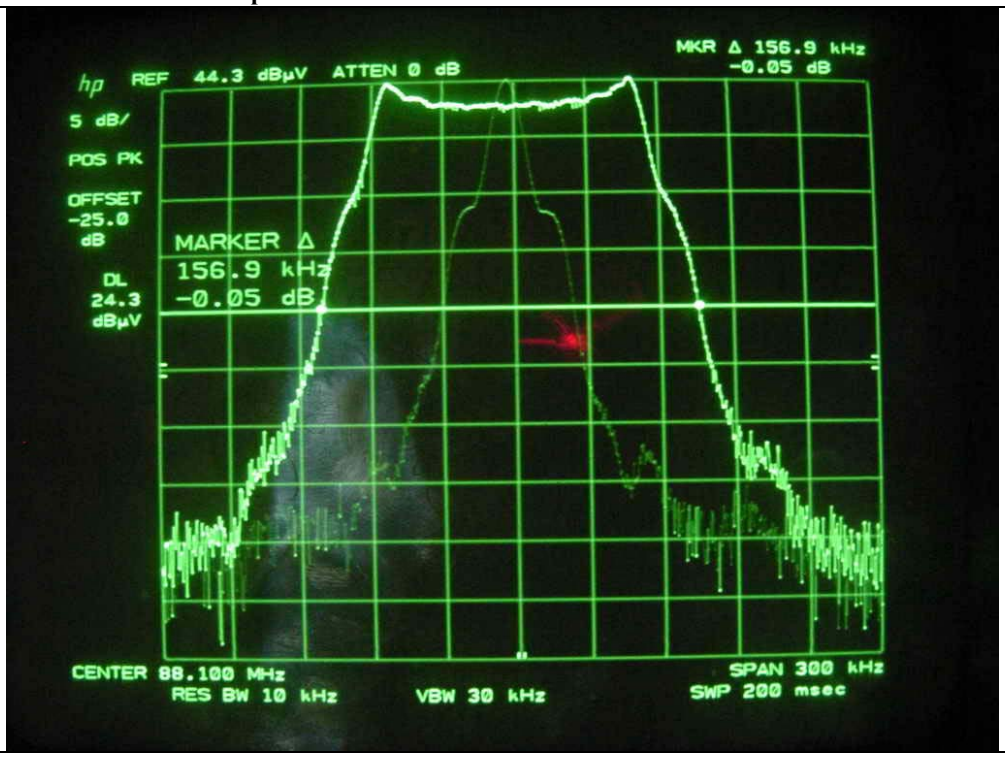
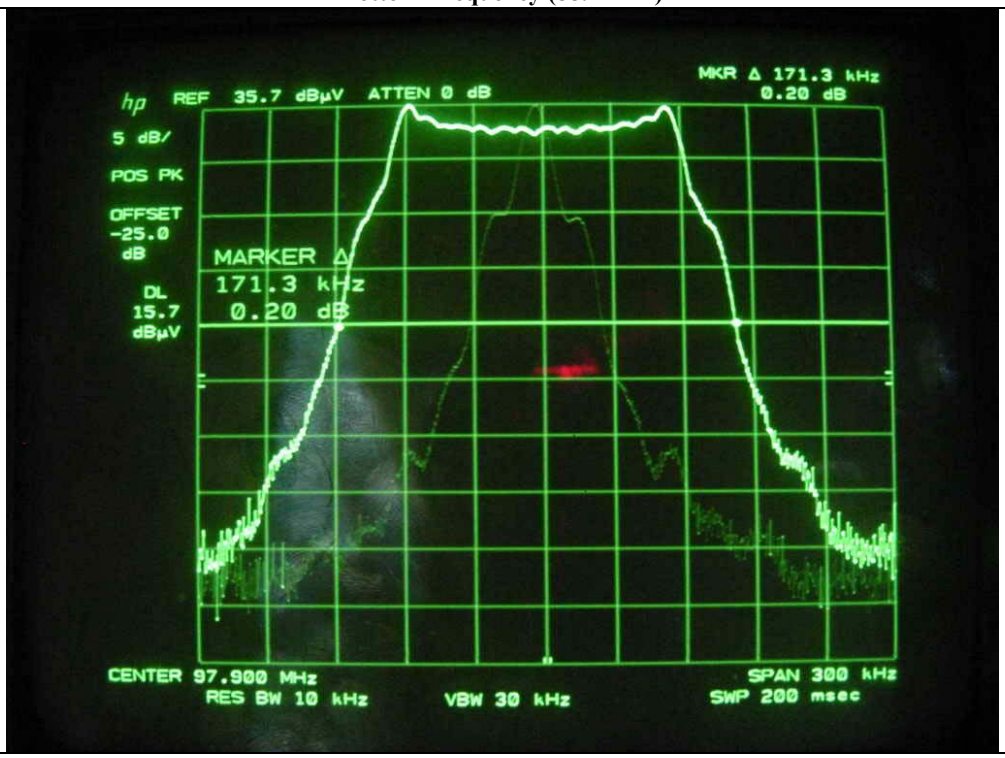
Operating Condition: AC/DC Adaptor Mode



Bottom Frequency (88.1MHz)



Middle Frequency (97.9MHz)

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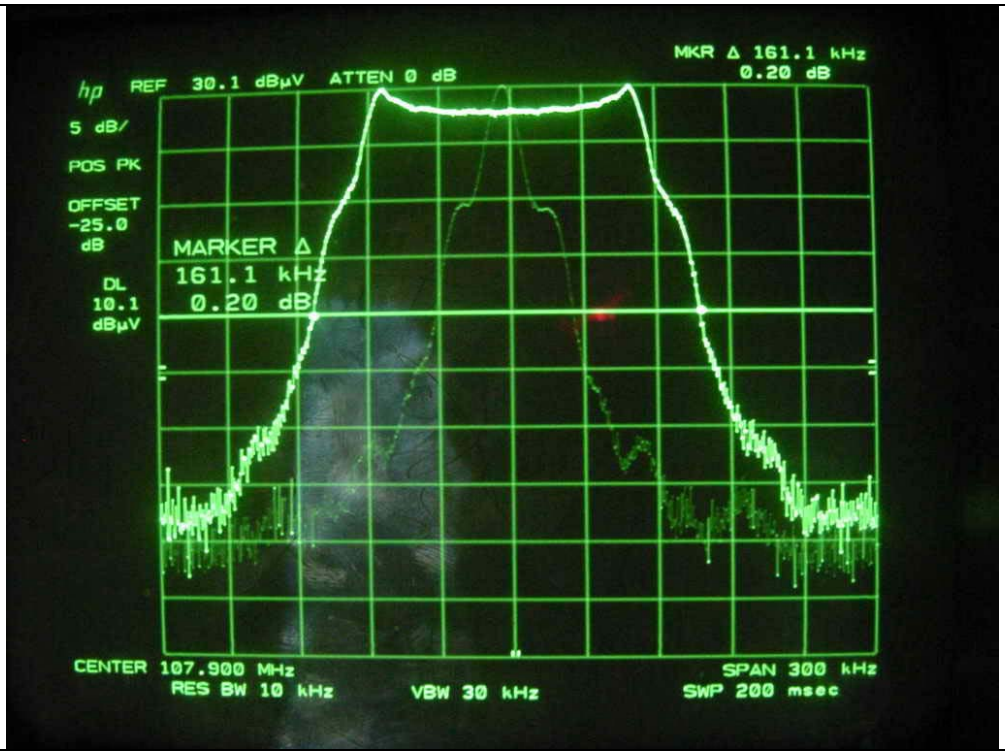
EMC Testing Dept : 307-51 Daessangryung-Ri, Chowol-Eup, Kwangju-City, Kyunggi-Do, 464-860, Korea. (TEL: +82-31-765-8289, FAX: +82-31-766-2904)



Top Frequency(107.9 MHz)

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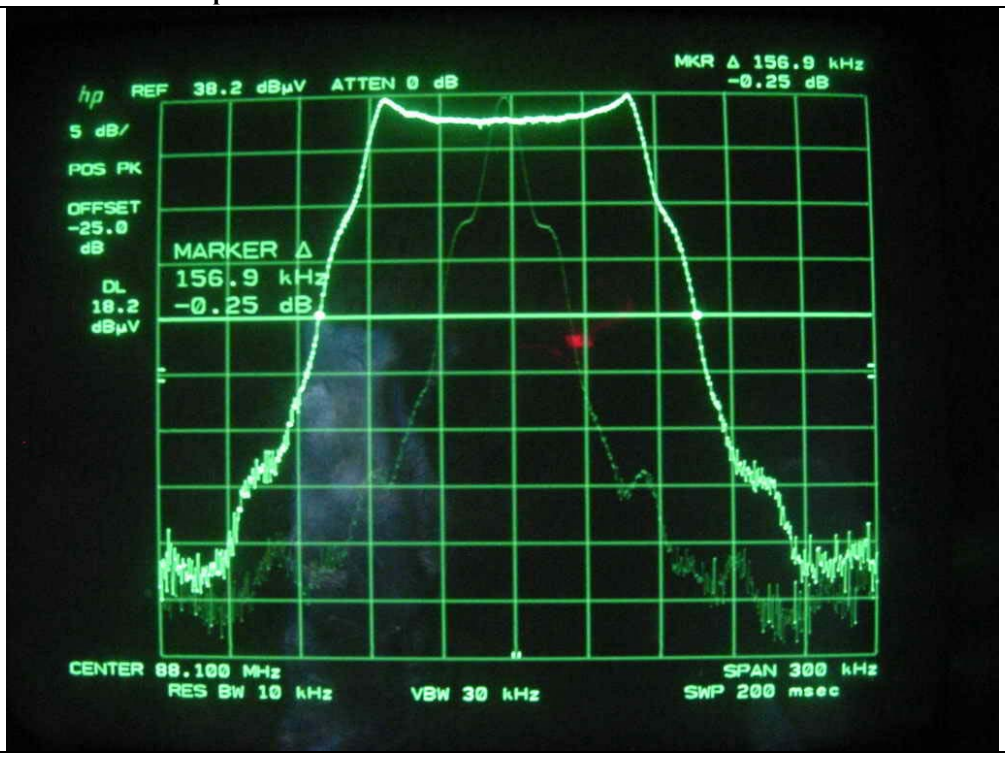
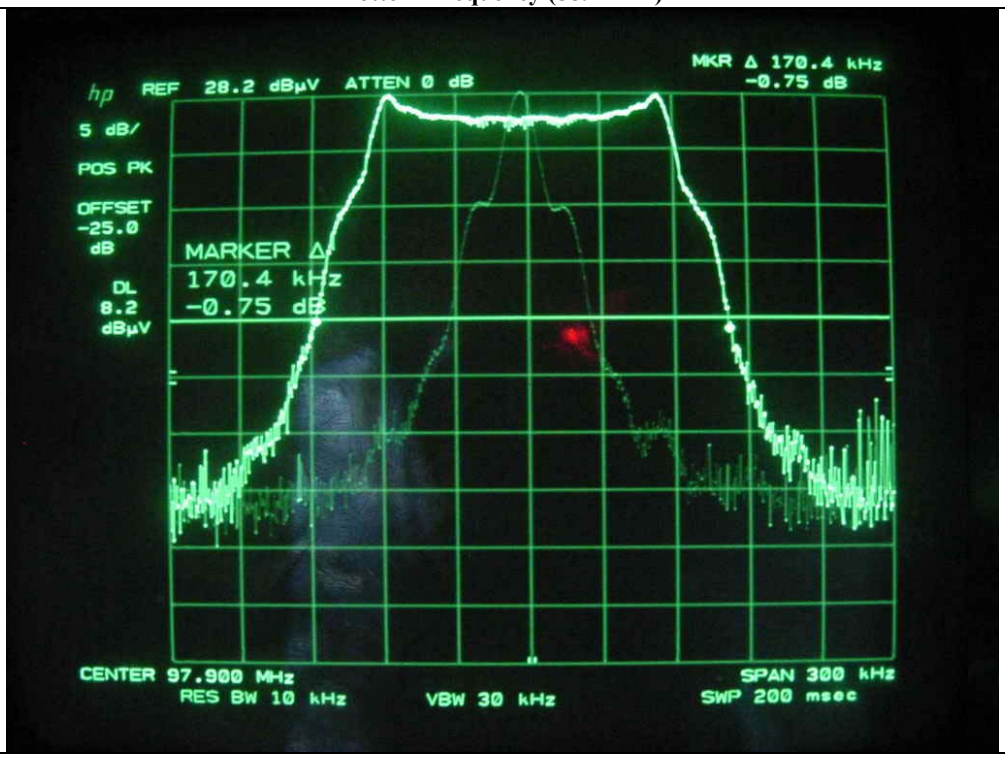
Operating Condition: Car Adaptor Mode



Bottom Frequency (88.1MHz)



Middle Frequency (97.9MHz)

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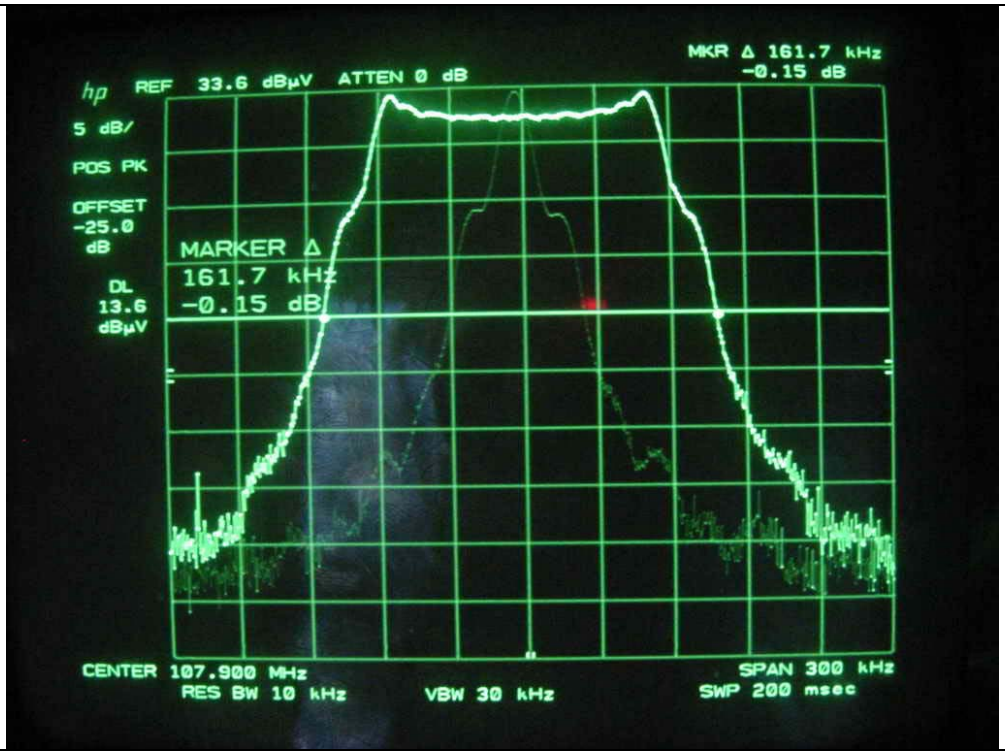

Top Frequency(107.9 MHz)

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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)

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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	■

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