Electromagnetic Emission

F C C M E A S U R E M E N T R E P O R T

CERTIFICATION OF COMPLIANCE

FCC Part 15 Certification Measurement

PRODUCT	:	Digital Satellite Radio
MODEL/TYPE NO	:	SIR-PnP3
FCC ID	:	P3HSIRPNP3
APPLICANT	:	Ki Ryung Electronics Co.,Ltd. 219-6 Gasan-Dong, Kumchun-Ku Seoul 153-023, Korea Guro Dan Ji P. O. Box 37 Attn. : In Kyoung Kim / Q.C Assistant Manager
FCC CLASSIFICATION	:	Low Power Communication Device Transmitter
FCC RULE PART(S)	:	Intentional Radiator
FCC PROCEDURE	:	Certification
TRADE NAME	:	Audiovox
TEST REPORT No.	:	E04.0823.FCC.483N
DATES OF TEST	:	August 17 ~ 24, 2004
DATES OF ISSUE	:	August 24, 2004
TEST LABORATORY	:	ETL Inc. (FCC Registration Number : 95422) #584 Sangwhal-ri, Kanam-myon, Yoju-kun, Kyounggi-do, 469-880, Korea Tel : (031) 885-0072 Fax : (031) 885-0074

This Digital Satellite Radio has been tested in accordance with the measurement procedures specified in ANSI C63.4-1992 at the ETL/EMC Test Laboratory and has been shown to be complied with the electromagnetic radiated emission limits specified in FCC Rule Part15 Subpart C section15.239.
I attest to the accuracy of data. All measurement herein performed by me or made under my supervision and correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.
The results of testing in this report apply to the product/system which was tested only. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Yo han, Park

Yo Han, Park / Chief Engineer

ETL Inc.

#584 Sangwhal-ri, Kanam-myon, Yoju-kun,
Kyounggi-do, 469-880, Korea

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Head Office: # 371-51 Kasan-Dong, Keumcheon-ku, Seoul, 153-023, Korea / Tel : 82-2-858-0786, Fax : 82-858-0788
EMC Lab : #584 Sangwhal-ri, Kanam-myon, Yoju-kun, Kyounggi-do, 469-885, Korea /Tel:82-31-885-0072, Fax:82-31-885-0074

Scope – *Measurement and determination of electromagnetic emission(EME) of radio frequency devices including intentional radiators and/or unintentional radiators for compliance with the technical rules and regulations of the U.S Federal Communications Commission(FCC)*

General Information

Applicant Name : Ki Ryung Electronics Co.,Ltd.

Address : 219-6 Gasan-Dong, Kumchun-Ku Seoul 153-023, Korea Guro Dan Ji P. O. Box 37

Attention : In Kyoung Kim / Q.C Assistant Manager

- **EUT Type :** Digital Satellite Radio
- **Model Number :** SIR-PnP3
- **FCC Identifier :** P3HSIRPNP3
- **S/N :** N/A
- **Freq. Range :** 88.10 MHz – 94.90 MHz
- **FCC Rule Part(s) :** Part 15 Subpart C Section 15.239
- **Test Procedure :** ANSI C63.4-1992
- **FCC Classification :** DXX - Low Power Communication Device Transmitter : Intentional Radiator
- **Dates of Tests :** August 17 ~ 24, 2004
- **Place of Tests :** ETL Inc.
  EMC Testing Lab. (FCC Registration Number : 95422)
  584, Sangwhal-Ri, Kanam-Myun, Yoju-Kun,
  Kyounggi-Do, 469-880, Korea
  Tel : (031) 885-0072 Fax : (031) 885-0074
- **Test Report No. :** E04.0823.FCC.483N

Head Office: # 371-51 Kasan-Dong, Keumcheon-ku, Seoul, 153-023, Korea / Tel : 82-2-858-0786, Fax : 82-858-0788
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1. INTRODUCTION

The measurement test for radiated and conducted emission test were conducted at the open area test site of E-RAE Testing Laboratory Inc. facility located at 584, Sangwhal-ri, Ganam-myun, Youju-kun, Kyoungki-do, Korea. The site is constructed in conformance with the requirements of the ANSI C63.4-1992 and CISPR Publication 16. The ETL has site descriptions on file with the FCC for 3 and 10 meter site configurations. Detailed description of test facility was found to be in compliance with the requirements of Section 2.948 FCC Rules according to the ANSI C63.4-1992 and registered to the Federal Communications Commission(Registration Number : 95422).

The measurement procedure described in American national standard for method of measurement of radio-noise emission from low-voltage electrical and electronic equipment in the range of 9 kHz to 40 GHz (ANSI C.63.4-1992) was used in determining radiated and conducted emissions from the Ki Ryung Electronics Co., Ltd. Model:SIR-PnP3

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EMC Lab : #584 Sangwhal-ri, Kanam-myon, Yoju-kun, Kyounggi-do, 469-885, Korea /Tel:82-31-885-0072, Fax:82-31-885-0074

2. PRODUCT INFORMATION

2.1 General Remark

2.2 Equipment Description

The Equipment Under Test(EUT) is the Ki Ryung Electronics Co., Ltd. Digital Satellite Radio. Model:SIR-PnP3(FCC ID : P3HSIRPNP3). This is FM transmitter. It's fixed inside the vehicle and powered 12V from Car battery. FM transmitter is designed to operate on frequency in the 88.10 ~ 94.90MHz(range into 200KHz Step)
The stereo audio signal is modulated the selected the frequency and the modulated RF is amplified by FM stereo transmitter IC.
The amplified RF is transmitted FM antenna.

2.3 General Specification

- Chassis Type	Plastic
- Audio Output	2.2V(Peak-to-peak)
- TV or FM Tuner RF module	RF module :JM2.5KR
- RF Frequency Out	80.10 MHz – 94.90 MHz
- Antenna Type	FM antenna
- Total Harmonic Distortion(THD)	< 0.3%
- Signal – to – noise(S/N)	Greater than 75 dB
- Fuse Requirement	3A Slow Blow
- Power Supply	10-16V, Negative Ground, DC
- Receiver Dimensions	110mm(W) * 70mm(H) * 28mm(D)
- Receiver Weight	261g

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3. DESCRIPTION OF TESTS

3.1 Conducted Emission Measurement

Conducted emissions measurements were made in accordance with section 11, "Measurement of Information Technology Equipment" of ANSI C63.4-1992. The measurement were performed over the frequency range of 0.15MHz to 30MHz using a 50Ω/50uH LISN as the input transducer to a Spectrum Analyzer or a Field Intensity Meter. The measurements were made with the detector set for "Peak" amplitude within a bandwidth of 10KHz or for "quasi-peak" within a bandwidth of 9KHz.

The line-conducted emission test is conducted inside a shielded anechoic chamber room with 1 m x 1.5 m x 0.8m wooden table in which is placed 40 cm away from the vertical wall, and 1.5m away from the side wall of the chamber room. Two EMCO 3825/2 LISNs are bonded to the shielded room. The EUT is powered from the EMCO LISN and the support equipment is powered from another EMCO LISN. Power to the LISNs is filtered by a noise cut power line filters. All electrical cables are shielded by braided tinned steel tubing with inner ϕ 1.2 cm. If the EUT is a DC-powered device, power will be derived from the source power supply it normally will be powered from and these supply lines will be connected to the EMCO LISN. All interconnecting cables more than 1m were shortened by non-inductive bundling(serpentine fashion) to a 1m length. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the R3261A Spectrum Analyzer to determine the frequency producing the max. emission from the EUT. The frequency producing the max. level was reexamined using the detector function set to the CISPR Quasi-Peak mode by manual, after scanned by automatic Peak mode from 0.15 to 30MHz. The bandwidth of the Spectrum Analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was maximized by switching power lines, varying the mode of operation or resolution, clock or data exchange speed, if applicable, whichever determined the worst-case emission. Each emission reported was calibrated using self-calibrating mode.
Photographs of the worst-case emission can be seen in photographs of conducted emission test setup.

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EMC Lab : #584 Sangwhal-ri, Kanam-myon, Yoju-kun, Kyounggi-do, 469-885, Korea /Tel:82-31-885-0072, Fax:82-31-885-0074

3. DESCRIPTION OF TESTS

3.2 Radiated Emission Measurement

Preliminary measurements were made at indoors 3meter semi EMC Anechoic Chamber using broadband antennas, broadband amplifier, and spectrum analyzer to determine the emission frequencies producing the maximum EME. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, mode of operation, turntable azimuth with respect to the antenna were noted for each frequency found. The spectrum was scanned from 30 to 1000 MHz using biconilog antenna and above 1000 MHz, linearly polarized double ridge horn antennas were used. Above 1 GHz, linearly polarized double ridge horn antennas were used. The measurements were performed with three frequencies which were selected as bottom, middle and top frequency in the operating band. Emission level from the EUT with various configurations were examined on the spectrum analyzer connected with the RF amplifier and plotted graphically.

Final measurements were made outdoors open site at 3-meter test range using biconilog antenna. The output from the antenna was connected, via a pre-selector or a preamplifier, to the input of the EMI Measuring Receiver and Spectrum analyzer(for above 1 GHz). The detector function was set to the quasi-peak or peak and average mode as appropriate. The measurement bandwidth on the Field strength receiver was set to at least 120 kHz (1MHz for measurement above 1 GHz), with all post-detector filtering no less than 10 times the measurement bandwidth. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition.

Each frequency found during preliminary measurement was examined and investigated as the same set up and configuration which produced the maximum emission The EUT, support equipment and interconnecting cables were configured to the set-up producing the maximum emission for the frequency and were placed on top of a 0.8-meter high non-metallic 1 m x 1.5 m table. The turntable containing the system was rotated and the antenna height was varied 1 to 4 meters and stopped at the azimuth or height producing the maximum emission.

Each emission was maximized by varying the mode of operating frequencies of the EUT. The system was tested in all the three orthogonal planes and changing the polarity of the antenna. The worst case emissions are recorded in the data tables. If necessary, the radiated emission measurement could be performed at a closer distance to ensure higher accuracy and the results were extrapolated to the specified distance using an inverse linear distance extrapolation factor (20 dB/decade) as per section 15.31(f).

Photographs of the worst-case emission test setup can be seen in Appendix B.

Head Office: # 371-51 Kasan-Dong, Keumcheon-ku, Seoul, 153-023, Korea / Tel : 82-2-858-0786, Fax : 82-858-0788

EMC Lab : #584 Sangwhal-ri, Kanam-myon, Yoju-kun, Kyounggi-do, 469-885, Korea /Tel:82-31-885-0072, Fax:82-31-885-0074

3. DESCRIPTION OF TESTS

3.3 Emission Bandwidth Measurement

Emissions from the intentional radiator shall be confined within a band 200 kHz wide centered on the operating frequency. The 200 kHz band shall lie wholly within the frequency range of 88 – 108 MHz.
Position the EUT as shown in the radiated emission measurement and set it to any one measured frequency within its operating range and make sure the measuring instrument is operated in its linear range. Set both RBW and VBW of the spectrum analyzer to 10 kHz and 100 kHz respectively with a convenient frequency span including 200kHz bandwidth of the emission.
The bandwidth of emission shall be no wider than of 200 kHz of the center frequency for EUT operating within 88.0 MHz to 108.0 MHz. The bandwidth is determined at the frequency 26 dB down from the modulated carrier.
Plot the graph on spectrum analyzer.

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4. TEST CONDITION

4.1 Test Configuration

The device was configured for testing in a typical fashion (as a customer would normally use it). During the tests, the EUT and the supported equipments were installed to meet FCC requirement and operated in a manner, which intends to maximize its emission level in a typical application.

4.2 EUT operation

The Equipment Under Test(EUT) is the Ki Ryung Electronics Co., Ltd. Digital Satellite Radio. Model:SIR-PnP3(FCC ID : P3HSIRPNP3). This is FM transmitter. It's fixed inside the vehicle and powered 12V from Car battery. FM transmitter is designed to operate on frequency in the 88.10 ~ 94.90 MHz(range into 200 kHz Step)
The stereo audio signal is modulated the selected the frequency and the modulated RF is amplified by FM stereo transmitter IC.
The amplified RF is transmitted FM antenna.

4.3 Support Equipment Used

Following peripheral devices and interface cables were connected during the measurement:

EUT- Satellite Radio Receiver

FCC ID	: P3HSIRPNP3
Model Name	: SIR-PnP3
Serial No.	: N/A
Manufacturer	: Ki ryung electronics
Power Supply Type	: DC 12V
Power Cord	: Two Pin
Interface Cable	: R.C.A Cable, Power Cable, RF Out Cable Line, Gps Antenna.

Support Unit 1 – DAB Radio

FCC ID	: N/A
Model Name	: FSP-2100
Serial No.	: N/A
Manufacturer	: Freesat Korea
Power Supply Type	: DC 12V
Interface cable	: DAB Antenna In

Support Unit 2 – AC/DC Adapter

FCC ID	: N/A
Model Name	: DSA-0131F-12 US 12
Serial No.	: None
Manufacturer	: DVE
Power Supply Type	: SMPS
Power Cord	: Two Pin

Other Support units : Speaker

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5. TEST RESULTS

5.1 Summary of Test Results

The measurement results were obtained with the EUT tested in the conditions described in this report. Detailed measurement data and plots showing the maximum emission of the EUT are reported.

FCC Rule Parts	Measurement Required	Result
15.207	Conducted Emission	Passed
15.239(b)	Radiated Emissions of RF Carrier frequency	Passed
15.239(c)	Out-of-band Radiated Emissions	Passed
15.239(a)	Emission Bandwidth Measurement	Passed

The data collected shows that the **Ki yung electronics. Digital Satellite Radio SIR-PnP3** complies with technical requirements of the Part 15.239 of the FCC Rules.

This equipment is the operated device by AC/DC Adaptor. The Conducted emission measurement according to the section 15.207 is applicable to this equipment,

The equipment is not modified anything, mechanical or circuits to improve EMI status during a measurement.
No EMI suppression device(s) was added and/or modified during testing.

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5. TEST RESULTS

5.2 Conducted Emissions Measurement

EUT	Digital Satellite Radio / SIR-PnP3 (SN: N/A)
Limit apply to	FCC Part15 Subpart C and CISPR 22 Class B
Test Date	August 17, 2004
Operating Condition	RF transmit with Satellite Radio Receiving mode
Environment Condition	Humidity Level: 44 %RH, Temperature: 23 ℃
Result	Passed by 7.15 dB

Conducted Emission Test Data

The following table shows the highest levels of conducted emissions on both polarizations of hot and neutral line.
Detector mode: CISPR Quasi-Peak mode (6 dB Bandwidth : 9 kHz)

Frequency [MHz]	Reading [dBμV]		Phase [*H/**V]	Limit [dBμV]		Margin [dB]	
	Quasi-peak	Average		Quasi-peak	Average	Quasi-peak	Average
0.154	58.63		H	65.78		7.15	
0.250	53.45	36.84	H	61.76	51.76	8.31	14.92
0.525	41.73		N	56.00		14.27	
0.789	39.17		N	56.00		16.83	
2.232	42.81		H	56.00		13.19	
4.050	42.24		H	56.00		13.76	
10.380	33.05		H	60.00		26.95	

NOTES:

1. *** H : HOT Line , **N : Neutral Line**
2. **Margin value = Limit – Reading**
3. **Measurement were performed at the AC/DC adapter in the frequency band of 150 kHz ~ 30 MHz according to the FCC Part15 Subpart C and CISPR 22 Class B**
4. **If the reading Quasi-Peak value is bellowed the average limit, do not test average mode.**

Test Engineer: H. S. Lee

Head Office: # 371-51 Kasan-Dong, Keumcheon-ku, Seoul, 153-023, Korea / Tel : 82-2-858-0786, Fax : 82-858-0788

EMC Lab : #584 Sangwhal-ri, Kanam-myon, Yoju-kun, Kyounggi-do, 469-885, Korea /Tel:82-31-885-0072, Fax:82-31-885-0074

5. TEST RESULTS
Line: HOT Line

ETL EMC Laboratory

Conducted Emission Test Result

EUT: SIR-PNP3
Manuf:
Op Cond:
Operator:
Test Spec: EN 55022 CLASS B
Comment: Hot

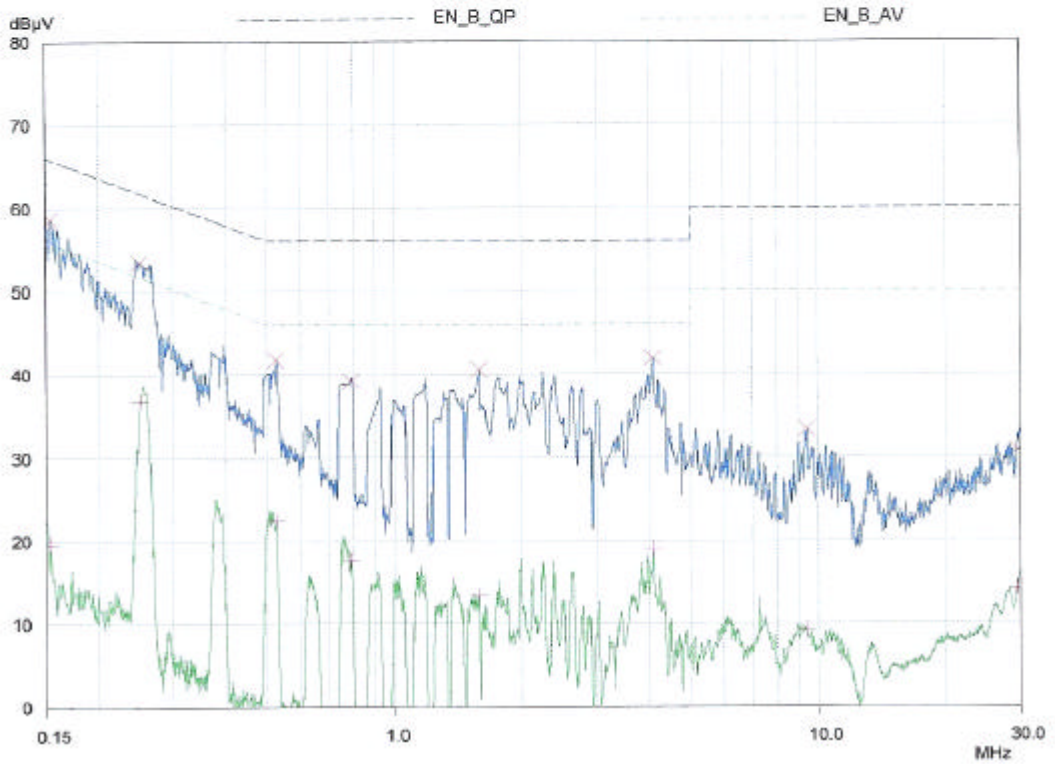
Result File: SPR1N.dat : Neutral

Scan Settings (3 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	1000kHz	1000Hz	10kHz	PK+AV	10msec	Auto	OFF	60dB
1000kHz	5MHz	2kHz	10kHz	PK+AV	10msec	Auto	OFF	60dB
5MHz	30MHz	5kHz	10kHz	PK+AV	10msec	Auto	OFF	60dB

Transducer	No.	Start	Stop	Name
	1	9kHz	30MHz	Factor

Prescan Measurement:		
	Detectors:	X PK / + AV
	Meas Time:	see scan settings
	Peaks:	8
	Acc Margin:	10 dB



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5. TEST RESULTS
Line: Neutral Line

ETL EMC Laboratory

Conducted Emission Test Result

EUT: SIR-PNP3
Manuf:
Op Cond:
Operator:
Test Spec: EN 55022 CLASS B
Comment: Neutral

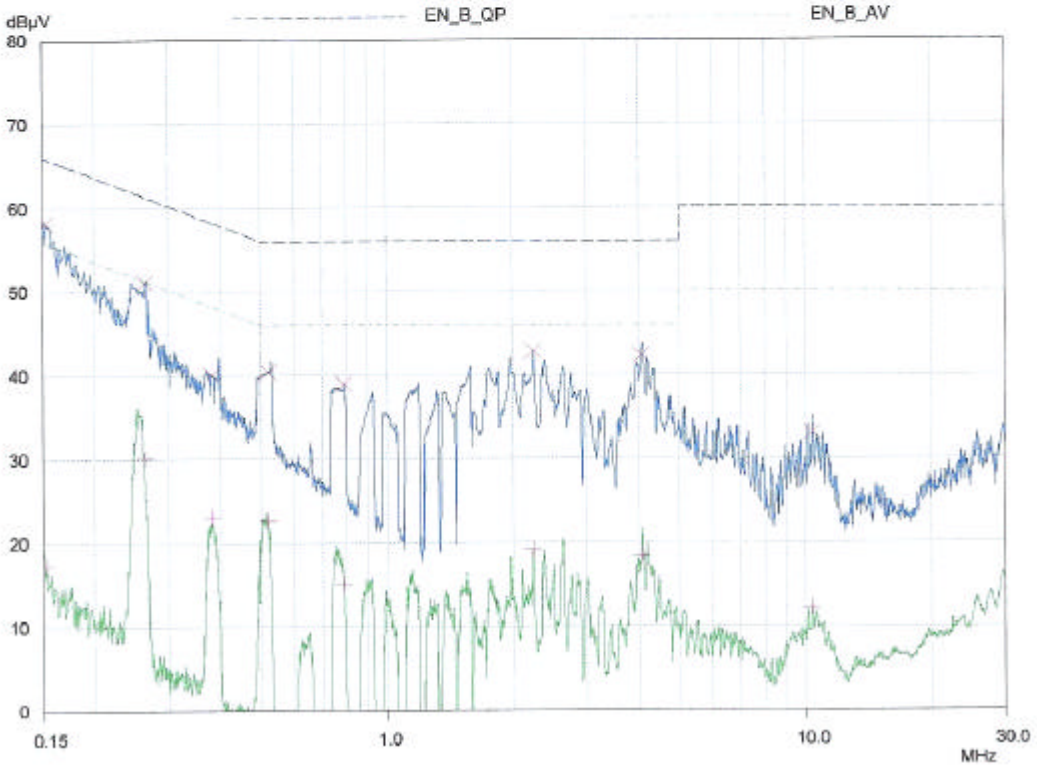
Result File: SPR1N.dat : Neutral

Scan Settings (3 Ranges)

Frequencies			Receiver Settings					
Start	Stop	Step	IF BW	Detector	M-Time	Atten	Preamp	OpRge
150kHz	1000kHz	1000Hz	10kHz	PK+AV	10msec	Auto	OFF	60dB
1000kHz	5MHz	2kHz	10kHz	PK+AV	10msec	Auto	OFF	60dB
5MHz	30MHz	5kHz	10kHz	PK+AV	10msec	Auto	OFF	60dB

Transducer	No.	Start	Stop	Name
	1	9kHz	30MHz	Factor

Prescan Measurement:		
	Detectors:	X PK / + AV
	Meas Time:	see scan settings
	Peaks:	8
	Acc Margin:	10 dB



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5. TEST RESULTS

5.3 Radiated Emissions of RF Carrier frequency

EUT	Digital Satellite Radio / SIR-PnP3 (SN: N/A)
Limit apply to	FCC Part15 Subpart C
Test Date	August 18, 2004
Operating Condition	RF transmit with Satellite Radio Receiving mode
Environment Condition	Humidity Level: 44 %RH, Temperature: 23 ℃
Result	Passed by 5.03 dB

The following table shows the highest levels of radiated emissions on both polarization of horizontal and vertical.

Detector mode : Peak mode

Measurement Distance : 3 meters

Frequency [MHz]	Reading [dBμV]	Polarization (*H/**V)	Ant. Factor [dB]	Cable Loss [dB]	Emission Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]
88.10	31.95	V	8.88	2.87	43.70	68.0	24.30
91.50	22.35	V	9.10	2.96	34.40	68.0	33.60
94.90	31.12	V	9.53	2.85	43.50	68.0	24.50

Detector mode : Average mode

Measurement Distance : 3 meters

Frequency [MHz]	Reading [dBμV]	Polarization (*H/**V)	Ant. Factor [dB]	Cable Loss [dB]	Emission Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]
88.10	30.75	V	8.88	2.87	42.50	48.0	5.50
91.50	21.85	V	9.10	2.96	33.91	48.0	14.09
94.90	30.59	V	9.53	2.85	42.97	48.0	5.03

NOTES :

1. *** H : Horizontal polarization , ** V : Vertical polarization**
2. **Emission Level = Reading + Antenna factor + Cable loss**
3. **Margin value = Limit - Emission Level**
4. **Measurement was performed at three frequencies as bottom, middle and top of the operating frequency range.**
5. **The EUT was tested in all the three orthogonal planes and the worst-case emission was vertical axes.**

Test Engineer: H. S. Lee

Head Office: # 371-51 Kasan-Dong, Keumcheon-ku, Seoul, 153-023, Korea / Tel : 82-2-858-0786, Fax : 82-858-0788

EMC Lab : #584 Sangwhal-ri, Kanam-myon, Yoju-kun, Kyounggi-do, 469-885, Korea /Tel:82-31-885-0072, Fax:82-31-885-0074

5. TEST RESULTS

5.4 Out-of-band Radiated Emissions

EUT	Digital Satellite Radio / SIR-PnP3 (SN: N/A)
Limit apply to	FCC Part15 Subpart C
Test Date	August 19, 2004
Operating Condition	RF transmit with Satellite Radio Receiving mode
Environment Condition	Humidity Level: 44 %RH, Temperature: 23 ℃
Result	Passed by 5.0 dB

Radiated Emission Test Data

The following table shows the highest levels of radiated emissions on both polarization of horizontal and vertical.(The test is 88.1, 91.5, 94.9 MHz worst case)
Detector mode : CISPR Quasi-Peak mode (6 dB Bandwidth : 120 kHz)
Measurement Distance : 3 meters

Frequency [MHz]	Reading [dBμV]	Polarization (*H/**V)	Ant. Factor [dB]	Cable Loss [dB]	Emission Level [dBμV/m]	Limit [dBμV/m]	Margin [dB]
52.50	15.14	V	12.16	2.10	29.40	40.0	10.60
97.49	25.77	V	9.85	2.78	38.40	43.5	5.10
117.95	23.56	H	11.88	3.06	38.50	43.5	5.00
126.81	18.75	H	12.54	3.20	34.50	43.5	9.00
660.57	7.58	H	18.05	9.36	35.00	46.0	11.00

NOTES :

1. *** H : Horizontal polarization , ** V : Vertical polarization**
2. **Emission Level = Reading + Antenna factor + Cable loss**
3. **Margin value = Limit - Emission Level**
4. **The EUT was tested in all the three orthogonal planes and the worst case of emissions was vertical axes.**

Test Engineer: H. S. Lee

Head Office: # 371-51 Kasan-Dong, Keumcheon-ku, Seoul, 153-023, Korea / Tel : 82-2-858-0786, Fax : 82-858-0788
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5. TEST RESULTS

5.5 Emission Bandwidth Measurement

EUT	Digital Satellite Radio / SIR-PnP3 (SN: N/A)
Limit apply to	FCC Part15 Subpart C
Test Date	August 19, 2004
Operating Condition	RF transmit with Satellite Radio Receiving mode
Environment Condition	Humidity Level: 44 %RH, Temperature: 23 ℃
Result	Passed

Measurement Data

Emission Frequency [MHz]	Emission Bandwidth [kHz]	Limit [kHz]	Remark
88.10	< 100	200	
91.50	< 100	200	
94.90	< 100	200	

NOTES :

1. **Please see the measured bandwidth plot in next page.**
2. **The emission bandwidth shall be no wider than 200kHz of the center frequency of the equipment operating within 88.0 MHz to 108,00 MHz. The bandwidth is determined at the points 26dB down from the modulated carrier.**
3. **Spectrum analyzer settings**
   Resolution bandwidth : 10 kHz
   Video bandwidth : 100 kHz
   Frequency span : 500 kHz

Test Engineer: H. S. Lee

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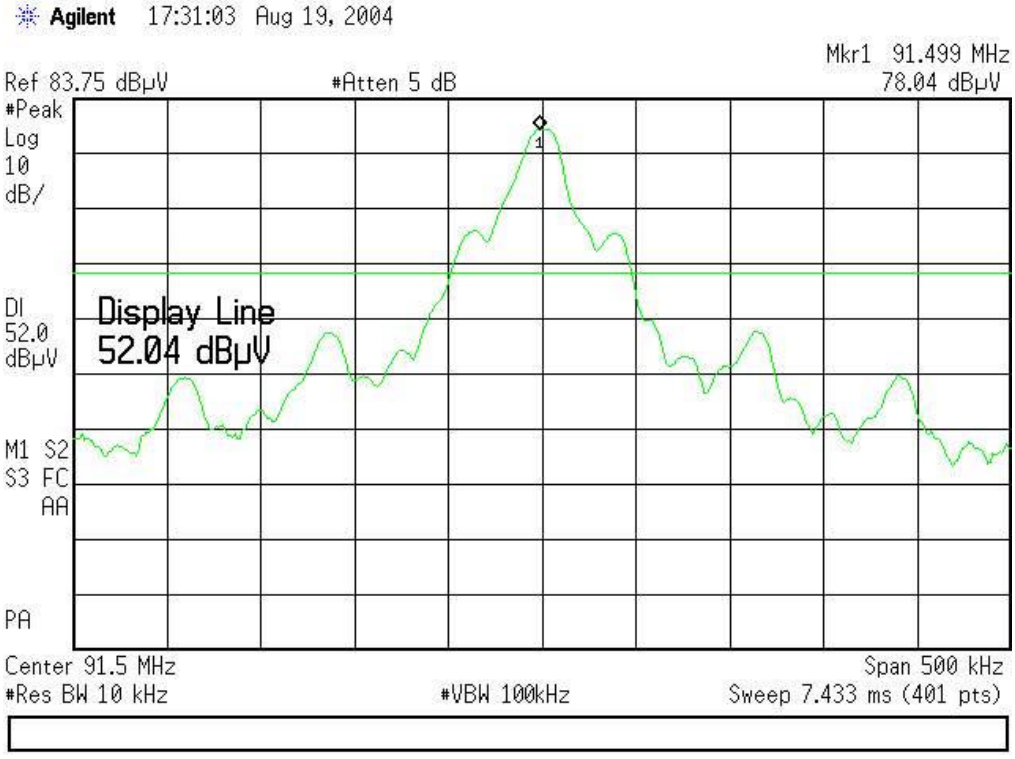
5. TEST RESULTS

88.1 MHz

91.5 MHz



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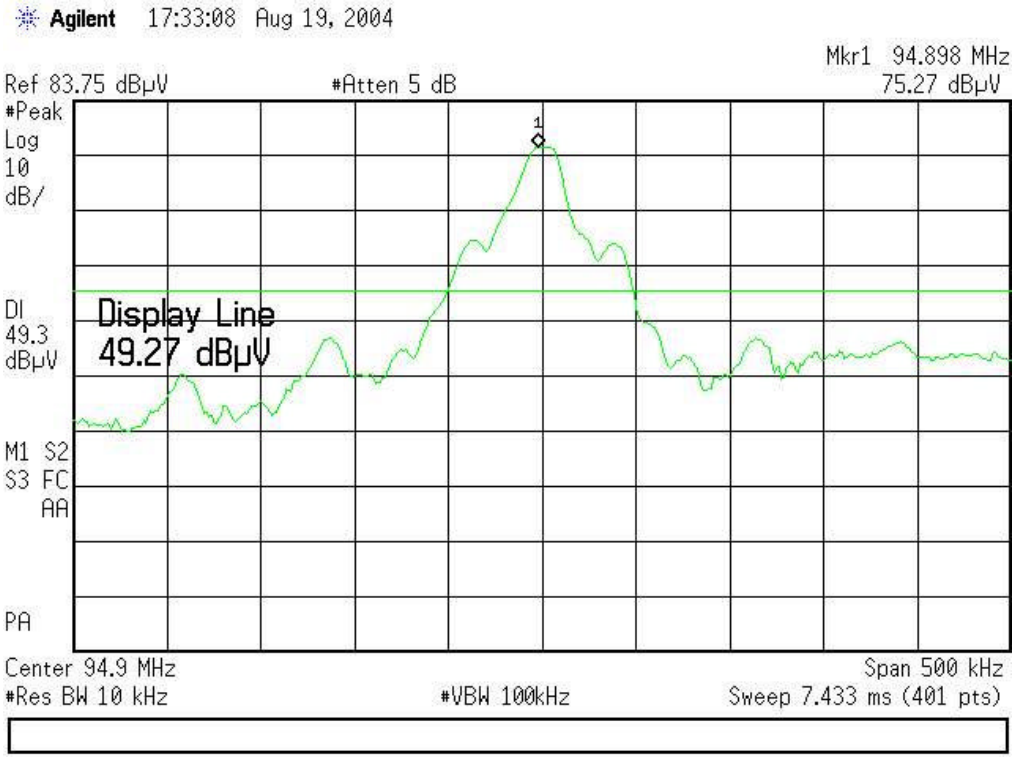
5. TEST RESULTS

94.9 MHz



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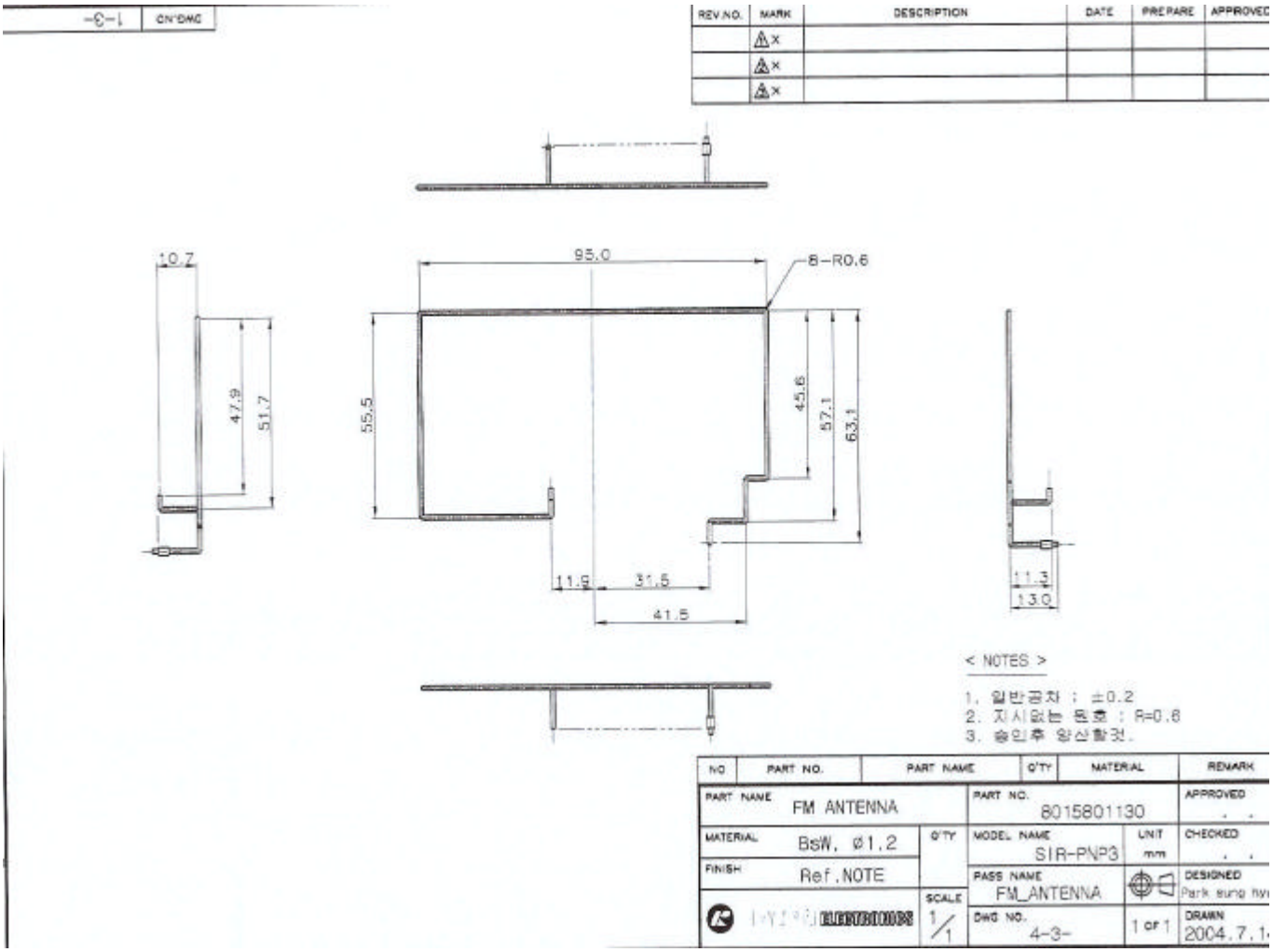
6. ANTENNA REQUIREMENT

6.1 Antenna Requirement

According to the 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. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to be complied.

6.2 Antenna Construction

The antenna used for the EUT is so designed that antenna other than that furnished by the manufacturer shall not be used with this device. The antenna supplied is a unique coupling to this Digital Satellite Radio The detailed design specification is attached to this report Appendix



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7. SAMPLE CALCULATION

Sample Field Strength Calculation

The field strength is calculated by adding the Antenna Factor and Cable Factor.
The basic equation with a sample calculation is as follows:

FS = RA + AF + CF

where FS = Field Strength
RA = Receiver Amplitude
AF = Antenna Factor
CF = Cable Attenuation Factor

dB(μV/m) = 20 $\log_{10}$ (μV /m) : Equation 1
dBμV = dBm + 107 : Equation 2

Example 1 : @ 0.154 MHz

Class B Limit = 1945.36 μV = 65.78 dBμV
Reading = 58.63dBμV
Convert to μV = 854.08 μV
Margin = 65.78 – 58.63 = 7.15 dBμV
= 7.15 dBμV below Limit

Example 2 : @ 117.95 MHz

Class B Limit = 149.62 μV = 43.50 dBμV
Reading = 23.56 dBμV
Antenna Factor + Cable Loss = 11.88 + 3.06 = 14.94 dBμV
Total = 38.50 dBμV
Margin = 43.50 – 38.50 = 5.00 dBμV
= 5.00 dBμV below Limit

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8. TEST EQUIPMENT LIST

List of Test Equipments Used for Measurements

Test Equipment		Model	Mfg.	Serial No.	Cal. Due Date
☒	Spectrum Analyzer	E7402A	H.P	US39110107	05-06-07
☒	Spectrum Analyzer	R3261A	Advantest	21720033	04-10-24
☒	Receiver	ESVS 10	R & S	835165/001	05-04-12
☒	EMI TEST Receiver	ESHS30	Rohde & Schwarz	0401901/002	05-03-29
☐	Preamplifier	HP 8347A	HP	2834A00544	05-04-12
☒	LISN	3825/2	EMCO	9006-1669	05-04-13
☒	LISN	3825/2	EMCO	9208-1995	05-01-29
☒	TriLog Antenna	VULB9160	Schwarz Beck	3082	05-07-27
☐	LogBicon	VULB9165	Schwarz Beck	2023	05-07-06
☐	Dipole Antenna	VHAP	Schwarz Beck	964	05-06-10
☐	Dipole Antenna	VHAP	Schwarz Beck	965	05-07-09
☐	Dipole Antenna	UHAP	Schwarz Beck	949	05-07-09
☐	Dipole Antenna	UHAP	Schwarz Beck	950	05-06-10
☐	Double Ridged Horn	3115	EMCO	9809-2334	05-09-20
☒	Turn-Table	DETT-03	Daeil EMC	-	N/A
☒	Antenna Master	DEAM-03	Daeil EMC	-	N/A
☐	Plotter	7440A	H.P	2725A 75722	N/A
☒	Chamber	DTEC01	DAETONG	-	N/A
☐	Thermo Hygrograph	3-3122	ISUZU	3312201	05-04-16
☐	BaroMeter	-	Regulus	-	-

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