TEST REPORT

of

FCC Part 15 Subpart C §15.209 /RSS-210 Issue 7 : 2007
FCC ID/IC Certification: PINHA-FH01/ 4018A-HAFH01

Equipment Under Test	:	Fob Holder
Model Name	:	HA-FH01
Serial No.	:	N/A
Applicant	:	Hyundai Autonet Co., Ltd.
Manufacturer	:	Hyundai Autonet Co., Ltd.
Date of Test(s)	:	2009.03.17 ~ 2009.03.27
Date of Issue	:	2009.04.09

In the configuration tested, the EUT complied with the standards specified above.

Tested By: **Date** **2009.04.09**

Duke Ko

Approved By **Date** **2009.04.09**

Denny Ham

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1. General Information

1.1. Testing Laboratory

SGS Testing Korea Co., Ltd.
Wireless Div. 2FL, 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea 435-040
www.electrolab.kr.sgs.ccom
Telephone : +82 +31 428 5700
FAX : +82 +31 427 2371

1.2. Details of Applicant

Applicant : Hyundai Autonet Co., Ltd.
Address : 8, 723, Mundeok-ri, Munbaek-Myeon, Jincheon-gun, Chungcheongbuk-do, Korea
Contact Person : Moon, Chang Min
Phone No. : +82 +31 596 8373

1.3. Description of EUT

Kind of Product	Fob Holder
Model Name	HA-FH01
Serial Number	N/A
Power Supply	DC 12 V
Frequency Range	125 kHz (Tx/Rx)
Modulation Technique	ASK
Frequency Generation	XTAL
Number of Channels	1 CH
Operating Conditions	-20℃ ~ 55℃
Antenna Type	Fixed Type(Loop ANT)

1.4. Details of Modification

-N/A

1.5. Test Equipment List

EQUIPMENT	MANUFACTURER	MODEL	CAL DUE.
Spectrum Analyzer	Agilent	E4440A	Apr. 01, 2010
Test Receiver	Rohde & Schwarz	ESHS10	Jul. 21, 2009
Test Receiver	Rohde & Schwarz	ESVS10	Jun. 30, 2009
Loop Antenna	Rohde & Schwarz	HFH2-Z2	Sep. 18, 2009
Ultra-Broadband Antenna	Rohde & Schwarz	HL562	Oct. 02, 2009
Anechoic Chamber	SY Corporation	L x W x H (9.6 m x 6.4 m x 6.6 m)	Jan. 31, 2010

1.6. Summary of Test Results

The EUT has been tested according to the following specifications:

Applied standard : FCC Part15 subpart C, RSS-210, RSS-Gen, Issue 7			
Standard section		**Test item**	**Result**
15.205(a)	RSS-210, Issue 7, Table 4	Radiated emission, Spurious Emission and Field Strength of Fundamental	Complied
15.109(a)	RSS-Gen, Issue 1, 7.2.3	Receiver Radiated Spurious Emission	Complied

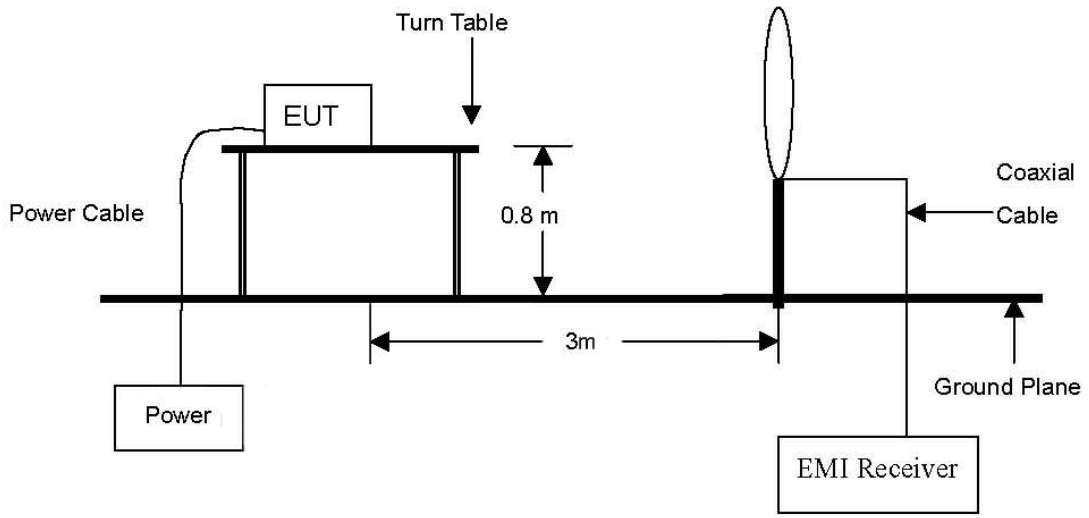
1.7 Test report revision

Revision	Report number	Description
0	F690501/RF-RTL003007	Initial

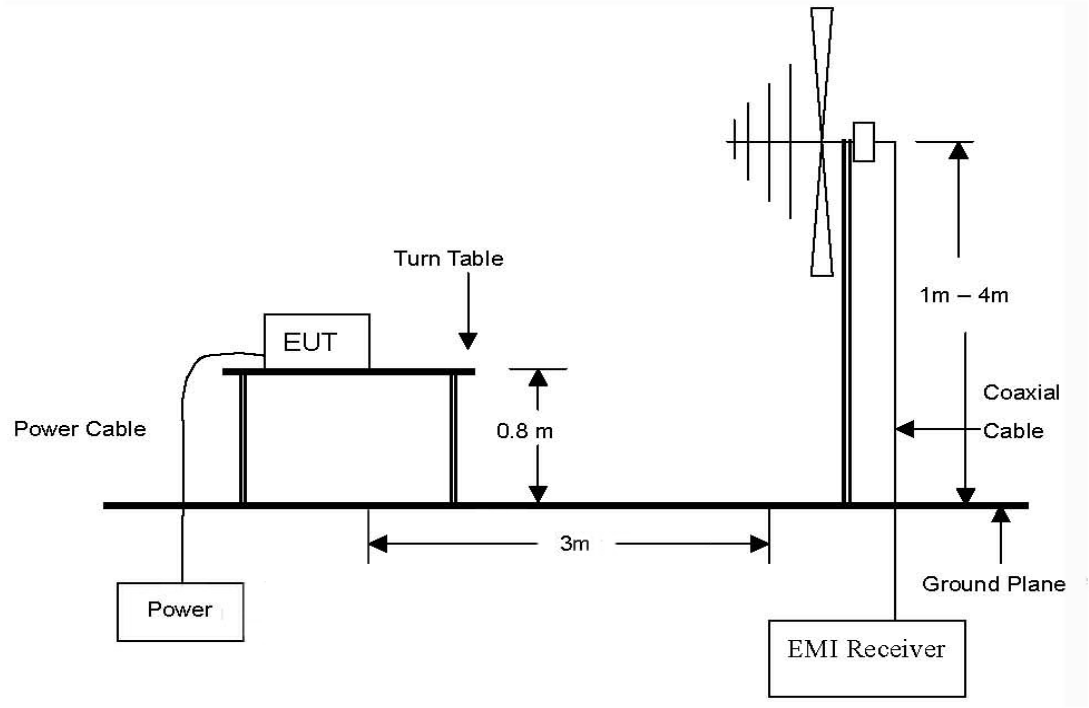
2. Field Strength of Fundamental

2.1. Test Setup

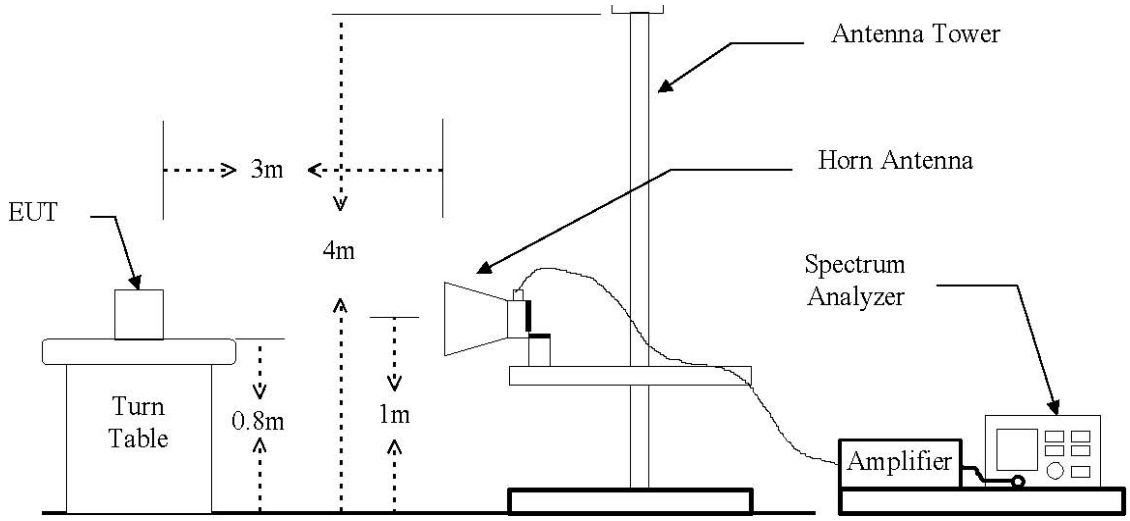
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz Emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to 18 GHz Emissions.



2.2. Limit

2.2.1. Radiated emission limits, general requirements

Except as provided elsewhere in this Subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

Frequency (MHz)	Field Strength (microvolts/meter)	Measurement Distance (meter)
0.009 – 0.490	2400/F(kHz)	300
0.490 – 1.705	2400/F(kHz)	30
1.705 – 30.0	30	30
30 -88	100**	3
88 -216	150**	3
216 - 960	200**	3
Above 960	500	3

** Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g., Sections 15.231 and 15.241

2.2.2. Periodic operation in the band 40.66-40.70 MHz and above 70 MHz

In addition to the provisions of Section 15.205, the field strength of emissions from intentional radiators operated under this Section shall not exceed the following:

Fundamental Frequency (MHz)	Field Strength of Fundamental (microvolts/meter)	Field Strength of Spurious Emissions (microvolts/meter)
40.66 – 47.70	2,250	225
70 - 130	1,250	125
130 – 174	1,250 to 3,750 **	125 to 375 **
174 – 260	3,750	375
260 – 470	3,750 to 12,500 **	375 to 1,250 **
Above 470	12,500	1,250

** linear interpolations

Where F is the frequency in MHz, the formulas for calculating the maximum permitted fundamental field strengths are as follows : for the band 130-174 MHz,, uV/m at 3 meters = 56.81818(F)-6136.3636; for the band 260-470 MHz, uV/m at 3 meters = 41.6667(F)-7083.333. The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

2.3. Test Procedures

Radiated emissions from the EUT were measured according to the dictates of ANSI C63.4:2003

2.3.1. Test Procedures for emission from 9 kHz to 30 MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
b. Then antenna is a loop antenna is fixed at one meter above the ground to determine the maximum value of the field strength. Both parallel and perpendicular of the antenna are set to make the measurement.
c. For each suspected emission, the EUT was arranged to its worst case and then the table was turned from 0 degrees to 360 degrees to find the maximum reading.
d. The test-receiver system was set to Average Detect Function and Specified Bandwidth with Maximum Hold Mode.

2.3.2. Test Procedures for emission from 30 MHz to 1000 MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
b. During performing radiated emission below 1 GHz, the EUT was set 3 meters away from the interference receiving antenna, which was mounted on the top of a variable-height antenna tower. During performing radiated emission above 1 GHz, the EUT was set 1 meter away from the interference-receiving antenna.
c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

2.4. Test Result

Ambient temperature : 24 ℃ Relative humidity : 47 %

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

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	Ant. (dB/m)	Cable (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
0.125	60.70	Q.P.	H	18.93	0.01	79.64	105.67	26.03

Remark:
To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ and YZ planes.

Note:
1. A Peak limit is 20 dB above the average limit.
2. 3m Limit(dBuV/m) = $20\log(2400/F_{(kHz)})+40\log(300/3)$
   = $20\log(2400/125)+40\log(300/3)$
   = $25.67+80$
   = 105.67

3. Spurious Emission

3.1. Test Setup

Same as section 2.1 of this report

3.2. Limit

Same as section 2.2 of this report

3.3. Test Procedures

Radiated emissions from the EUT were measured according to the dictates of ANSI C63.4:2003

3.3.1. Test Procedures for emission from 9 kHz to 30 MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
b. Then antenna is a loop antenna is fixed at one meter above the ground to determine the maximum value of the field strength. Both parallel and perpendicular of the antenna are set to make the measurement.
c. For each suspected emission, the EUT was arranged to its worst case and then the table was turned from 0 degrees to 360 degrees to find the maximum reading.
d. The test-receiver system was set to Average Detect Function and Specified Bandwidth with Maximum Hold Mode.

3.3.2. Test Procedures for emission from 30 MHz to 1000 MHz

a. The EUT was placed on the top of a rotating table 0.8 meters above the ground at a 3 meter anechoic chamber test site. The table was rotated 360 degrees to determine the position of the highest radiation.
b. During performing radiated emission below 1 GHz, the EUT was set 3 meters away from the interference receiving antenna, which was mounted on the top of a variable-height antenna tower. During performing radiated emission above 1 GHz, the EUT was set 1 meter away from the interference-receiving antenna.
c. The antenna is a broadband antenna, and its height is varied from one meter to four meters above the ground to determine the maximum value of the field strength. Both horizontal and vertical polarizations of the antenna are set to make the measurement.
d. For each suspected emission, the EUT was arranged to its worst case and then the antenna was tuned to heights from 1 meter to 4 meters and the table was turned from 0 degrees to 360 degrees to find the maximum reading.
e. The test-receiver system was set to Peak Detect Function and Specified Bandwidth with Maximum Hold Mode.
f. If the emission level of the EUT in peak mode was 10 dB lower than the limit specified, then testing could be stopped and the peak values of the EUT would be reported. Otherwise the emissions that did not have 10 dB margin would be re-tested one by one using peak, quasi-peak or average method as specified and then reported in a data sheet.

3.4. Test Result

Ambient temperature : 24 ℃ Relative humidity : 47 %

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

Radiated Emissions			Ant	Correction Factors		Total	FCC Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF/CL (dB/m)/(dB)	Amp Gain (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
0.379	21.92	Q.P.	H	18.88/0.01	-	40.81	96.03	55.36
Above 0.400	Not detected	-	-	-	-	-	-	-

Remark:
To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ and YZ planes.

Note:
1. A Peak limit is 20 dB above the average limit.
2. Other Spurious Emission Frequencies were not detected up to 1000 MHz.
3. 3m Limit(dBuV/m) = $20\log(2400/F_{(kHz)})+40\log(300/3)$
   = $20\log(2400/379)+40\log(300/3)$
   = 16.03+80
   = 96.03

4. Receiver Spurious Emission (Radiated)

4.1. Test Setup

Same as section 3.1 of this report

4.2. Limit

See below for references

Spurious Frequency (MHz)	Field Strength (microvolt/m at 3 meters)
30 – 88	100
88 – 216	150
216 -960	200
Above 960	500

4.3. Test Procedures

Same as section 3.3 of this report

4.4. Test Result

Ambient temperature : 24 ℃ Relative humidity : 47 %

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

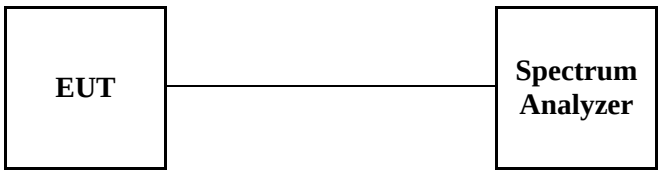
Radiated Emissions			Ant	Correction Factors		Total	IC Limit	
Frequency (MHz)	Reading (dBuV)	Detect Mode	Pol.	AF/CL (dB/m)/(dB)	Amp Gain (dB)	Actual (dBuV/m)	Limit (dBuV/m)	Margin (dB)
Above 30.000	Not detected	-	-	-	-	-	-	-

Remark:
To get a maximum emission level from the EUT, the EUT was moved throughout the XY, XZ and YZ planes.

Note:
1. Other spurious frequencies were not detected up to 1000 MHz.

5. Occupied Bandwidth(99% BW)

5.1. Test Setup



5.2. Limit

None ; for reporting purpose only

5.3. Test Procedure

1. The transmitter output is connected to the spectrum analyzer.
2. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using RBW=1 kHz, VBW=1 kHz and Span=100 kHz.
3. The bandwidth of fundamental frequency was measured and recorded.

5.4. Test Result

Ambient temperature : 24 ℃ Relative humidity : 47 %

Carrier Frequency (MHz)	Bandwidth of the emission (kHz)	Limit (kHz)	Remark
0.125	25.60	-	-