

MPE TEST REPORT

of

FCC CFR 47 part 1, 1.1307(b), 1.1310

FCC ID/IC Certification : TQ8-AC1B3A5AN / 5074A-AC1B3A5KN

Equipment Under Test : DIGITAL CAR AUDIO SYSTEM
FCC Basic Model Name : AC1B3A5AN
IC Basic Model Name : AC1B3A5KN
FCC Alternative Model Name : AC1B2A5AN, AC111A5GG
IC Alternative Model Name : AC111A5KN
Applicant : Hyundai MOBIS Co., Ltd.
Manufacturer : Hyundai MOBIS Co., Ltd.
Date of Test(s) : 2014.05.08 ~ 2014.05.12
Date of Issue : 2014.05.19

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

Tested By:



Date:

2014. 05. 19

Hyunchea You

Approved By:



Date:

2014. 05. 19

Jeong Feel

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INDEX

<u>Table of Contents</u>	Page
1. General Information -----	3
2. RF Exposure Evaluation -----	4

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1. General Information

1.1. Testing Laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)

-Wireless Div. 3FL, 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 435-040

All SGS services are rendered in accordance with the applicable SGS conditions of service available on request and accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>.

Telephone : +82 31 428 5700

FAX : +82 31 427 2371

1.2. Details of Applicant

Applicant : Hyundai MOBIS Co., Ltd.

Address : 203, Teheran-ro, Gangnam-gu, Seoul, 135-977, Korea

Contact Person : Choi, Seung-Hoon

Phone No. : +82 31 260 0098

1.3. Description of EUT

Kind of Product	DIGITAL CAR AUDIO SYSTEM
FCC Basic Model Name	AC1B3A5AN
IC Basic Model Name	AC1B3A5KN
FCC Alternative Model Name	AC1B2A5AN, AC111A5GG
IC Alternative Model Name	AC111A5KN
Power Supply	DC 14.4 V
Frequency Range	2 402 MHz ~ 2 480 MHz
Modulation Technique	GFSK, $\pi/4$ DQPSK, 8DPSK
Number of Channels	79
Antenna Type	Chip Antenna
Antenna Gain	-5.03 dBi

1.4. Test report revision

Revision	Report number	Date of Issue	Description
0	F690501/RF-RTL007663	2014. 05. 19	Initial

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SGS Korea Co., Ltd. (Gunpo Laboratory)

4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 435-040

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RTT5041-20(2014.01.20)(2)

Tel. +82 31 428 5700 / Fax. +82 31 427 2370

A4(210 mm x 297 mm)

2. RF Exposure Evaluation

2.1. Environmental evaluation and exposure limit according to FCC CFR 47 part 1, 1.1307(b), 1.1310

According to FCC 1.1310 : The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in §1.1307(b)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency Range (MHz)	Electric Field Strength(V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	Average Time
(A) Limits for Occupational /Control Exposures				
300 – 1 500	--	--	F/300	6
1 500 – 100 000	--	--	5	6
(B) Limits for General Population/Uncontrol Exposures				
300 – 1 500	--	--	F/1500	6
<u>1 500 – 100 000</u>	--	--	<u>1</u>	<u>30</u>

2.1.1. Friis transmission formula: $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2)$

Where P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

R = distance between observation point and center of the radiator in cm

P_d the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance where the MPE limit is reached.

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2.1.2. Test Result of RF Exposure Evaluation

Test Item : RF Exposure Evaluation Data

Test Mode : Normal Operation

2.1.3. Output Power into Antenna & RF Exposure Evaluation Distance

FHSS : GFSK

Channel	Channel Frequency (MHz)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Duty Cycle (%)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
Low	2 402	-0.89	-3.50	77.0	0.000 094	1
Middle	2 441	-0.14	-3.50	77.0	0.000 112	1
High	2 480	0.89	-3.50	77.0	0.000 142	1

Mode	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	LIMITS (mW/cm ²)
Maximum tune up tolerance	4.00	-3.50	0.000 290	1

FHSS : $\pi/4$ DQPSK

Channel	Channel Frequency (MHz)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Duty Cycle (%)	Power Density at 20 cm (mW/cm ²)	Limits (mW/cm ²)
Low	2 402	-1.39	-3.50	77.6	0.000 083	1
Middle	2 441	-0.53	-3.50	77.6	0.000 101	1
High	2 480	-0.17	-3.50	77.6	0.000 110	1

Mode	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	LIMITS (mW/cm ²)
Maximum tune up tolerance	4.00	-3.50	0.000 288	1

Note :

1. The power density Pd (5th column) at a distance of 20 cm calculated from the friis transmission formula is far below the limit of 1 mW/cm².

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