

# MPE TEST REPORT

of

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

FCC ID: TQ8-AC213IXAN

Equipment Under Test : DIGITAL CAR AUDIO SYSTEM

Model Name : AC231IXAN

Serial No. : N/A

Applicant : Hyundai MOBIS Co., Ltd.

Manufacturer : Hyundai MOBIS Co., Ltd.

Date of Test(s) : 2013.03.04 ~ 2013.03.07

Date of Issue : 2013.03.08

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

Tested By:



Date:

2013.03.08

\_\_\_\_\_  
Harim Lee

Approved By:



Date:

2013.03.08

\_\_\_\_\_  
Denny Ham

*The results shown in this test report refer only to the sample(s) tested unless otherwise stated. This test report cannot be reproduced, except in full, without prior written permission of the Company.*

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## 1. General Information

### 1.1. Testing Laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)

- Wireless Div. 3FL, 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea 435-040 (Lab)
- Wireless Div. 1FL, 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea 435-040 (Chamber)

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### 1.2. Details of Applicant

Applicant : Hyundai MOBIS Co., Ltd.

Address : 80-9, Mabook-Dong, Giheung-Gu Yongin-Shi, Gyeonggi-Do, 446-912, South Korea

Contact Person : Kim, Jong-Tae

Phone No. : +82 31 260 0092

### 1.3. Description of EUT

Kind of Product	DIGITAL CAR AUDIO SYSTEM
Model Name	AC231IXAN
Serial Number	N/A
Power Supply	DC 14.4 V (Used on vehicle battery)
Frequency Range	2 402 MHz ~ 2 480 MHz
Modulation Technique	GFSK, $\pi/4$ DQPSK, 8DPSK
Number of Channels	79
Antenna Type	Pattern Antenna
Antenna Gain	-5.5 dB i

### 1.4. Test report revision

Revision	Report number	Description
0	F690501/RF-RTL006305	Initial

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## 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 <sup>2</sup> )	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
<b><u>1 500 – 100 000</u></b>	--	--	<b><u>1</u></b>	<b><u>30</u></b>

#### 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/cm<sup>2</sup>

$P_{out}$  = output power to antenna in mW

$G$  = gain of antenna in linear scale

$\pi$  = 3.1416

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

$P_d$  the limit of MPE, 1 mW/cm<sup>2</sup>. 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 <sup>2</sup> )	Limits (mW/cm <sup>2</sup> )
Low	2 402	0.78	-5.5	46	0.000 031	1
Middle	2 441	0.76	-5.5	46	0.000 031	1
High	2 480	0.52	-5.5	46	0.000 029	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 <sup>2</sup> )	Limits (mW/cm <sup>2</sup> )
Low	2 402	-0.74	-5.5	42	0.000 020	1
Middle	2 441	-1.10	-5.5	42	0.000 018	1
High	2 480	-1.59	-5.5	42	0.000 016	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/cm<sup>2</sup> .

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