

# MPE TEST REPORT

of

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

FCC ID: TQ8-AC231SLAN

Equipment Under Test : DIGITAL CAR AUDIO SYSTEM

Model Name : AC231SLAN

Serial No. : N/A

Applicant : Hyundai MOBIS Co., Ltd.

Manufacturer : Hyundai MOBIS Co., Ltd.

Date of Test(s) : 2013.05.16

Date of Issue : 2013.05.16

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

Tested By:



Date:

2013.05.16

Harim Lee

Approved By:



Date:

2013.05.16

Hyunchae You

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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, 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)

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

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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	AC231SLAN
Serial Number	N/A
Power Supply	DC 14.4 V (Lead-acid battery power source used on vehicles)
Frequency Range	2 402 MHz ~ 2 480 MHz
Modulation Technique	GFSK, $\pi/4$ DQPSK, 8DPSK
Number of Channels	79
Antenna Type	Inverted-F Antenna
Antenna Gain	-8.28 dB i

### 1.4. Test report revision

Revision	Report number	Description
0	F690501/RF-RTL006535	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	0.50	-8.28	77	0.000 026	1
Middle	2 441	0.91	-8.28	77	0.000 028	1
High	2 480	0.41	-8.28	77	0.000 025	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	-0.07	-8.28	77	0.000 022	1
Middle	2 441	-0.15	-8.28	77	0.000 022	1
High	2 480	-0.77	-8.28	77	0.000 019	1

#### FHSS: 8DPSK

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	-0.12	-8.28	77	0.000 022	1
Middle	2 441	-0.18	-8.28	77	0.000 022	1
High	2 480	-1.05	-8.28	77	0.000 018	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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