

MPE TEST REPORT

of

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

FCC ID: TQ8- AV230SLAN

Equipment Under Test : DIGITAL CAR AUDIO SYSTEM
Model Name : AV230SLAN (Alt: AV231SLAN, AV2A0SLKN)
Serial No. : N/A
Applicant : Hyundai MOBIS Co., Ltd.
Manufacturer : Hyundai MOBIS Co., Ltd.
Date of Test(s) : 2013.07.08 ~ 2013.07.09
Date of Issue : 2013.07.09

Tested By:



Hyunchoe You

Date:

2013.07.09

Approved By:



Feel Jeong

Date:

2013.07.09

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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)
- 413-15, Gomae-Dong, Giheung-Gu, Yongin-Si, Gyeonggi-Do, South Korea. (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	AV230SLAN (Alt: AV231SLAN, AV2A0SLKN)
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	Chip antenna
Antenna Gain	3.5 dB i

1.4. Test report revision

Revision	Report number	Description
0	F690501/RF-RTL006734	Initial

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1.5. Alternative models

Model name	Information
AV230SLAN	- Basic model - North America, HD Radio, Non-TMU
AV231SLAN	- Same to basic model but it is different below function - North America, HD Radio, TMU
AV2A0SLKN	- Same to basic model but it is different below function - Canada, Non-TMU

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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 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	-0.46	3.5	45	0.000 180	1
Middle	2 441	0.21	3.5	45	0.000 210	1
High	2 480	0.44	3.5	45	0.000 222	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	-0.61	3.5	46	0.000 178	1
Middle	2 441	-0.12	3.5	46	0.000 199	1
High	2 480	-0.41	3.5	46	0.000 186	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 ²)	Limits (mW/cm ²)
Low	2 402	-0.58	3.5	46	0.000 179	1
Middle	2 441	-0.08	3.5	46	0.000 201	1
High	2 480	-0.39	3.5	46	0.000 187	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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