MPE TEST REPORT

of

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

FCC ID : TQ8-AT240A5AN

Equipment Under Test	:	DIGITAL CAR AVNT SYSTEM
Model Name	:	AT240A5AN
Applicant	:	Hyundai MOBIS Co., Ltd.
Manufacturer	:	Hyundai MOBIS Co., Ltd.
Date of Test(s)	:	2014.06.23 ~ 2014.06.30
Date of Issue	:	2014.07.03

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

Tested By: **Wonjun Sim** **Date:** **2014.07.03**

Approved By: **Hyunchae You** **Date:** **2014.07.03**

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1. General Information

1.1. Testing Laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)
-Wireless Div. 2FL, 10-2, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 435-837
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 : 203, Teheran-ro, Gangnam-gu, Seoul, 135-977, Korea
Contact Person : Choi, Seung-Hun
Phone No. : +82 31 260 0098

1.3. Description of EUT

Kind of Product	DIGITAL CAR AVNT SYSTEM
Model Name	AT240A5AN
Power Supply	DC 14.4 V (Vehicle Battery)
Frequency Range	824.70 ㎒ ~ 848.31 ㎒ (CDMA850) 1 851.25 ㎒ ~ 1 908.75 ㎒ (CDMA1900) 2 402 ㎒ ~ 2 480 ㎒ (BT) 2 412 ㎒ ~ 2 462 ㎒ (11b/g/n_HT20)
Antenna Gain	824.70 ㎒ ~ 848.31 ㎒ : 2.99 ㏈i, 1 851.25 ㎒ ~ 1 908.75 ㎒ : 5.09 ㏈i, 2 402 ㎒ ~ 2 480 ㎒ : -3.26 ㏈i, 2 412 ㎒ ~ 2 462 ㎒ : 3.08 ㏈i

1.4. Test report revision

Revision	Report number	Date of Issue	Description
0	F690501/RF-RTL007793	2014.07.03	Initial

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 (㎒)	Electric Field Strength(V/m)	Magnetic Field Strength (A/m)	Power Density (㎽/㎠)	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**	**30**
1 500 – 100 000	**--**	**--**	**1**	**30**

2.1.1. Friis transmission formula: Pd = (Pout*G)/(4*pi*R^2)

Where Pd = power density in ㎽/㎠

Pout = output power to antenna in ㎽

G = gain of antenna in linear scale

Pi = 3.1416

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

Pd the limit of MPE, 1 ㎽/㎠. 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.

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

Mode: CDMA850 1xRTT

Channel	Channel Frequency (㎒)	Measured E.R.P. (㏈m)	Duty Cycle (%)	Power Density at 20 ㎝ (㎽/㎠)	LIMITS (㎽/㎠)
Low	824.70	25.46	100	0.069 941	0.549 80
Middle	836.52	23.27	100	0.042 241	0.557 68
High	848.31	24.82	100	0.060 357	0.565 54

Mode	Channel Frequency (㎒)	Output Average Power to Antenna (㏈m)	Antenna Gain (㏈i)	Power Density at 20 ㎝ (㎽/㎠)	LIMITS (㎽/㎠)
Maximum tune up tolerance	824.70	25.50	2.99	0.071 692	0.549 80

Mode: CDMA1 900 1xRTT

Channel	Channel Frequency (㎒)	Measured E.I.R.P. (㏈m)	Duty Cycle (%)	Power Density at 20 ㎝ (㎽/㎠)	LIMITS (㎽/㎠)
Low	1 851.25	26.63	100	0.091 565	1
Middle	1 880.00	27.68	100	0.116 608	1
High	1 908.75	26.83	100	0.095 880	1

Mode	Channel Frequency (㎒)	Output Average Power to Antenna (㏈m)	Antenna Gain (㏈i)	Power Density at 20 ㎝ (㎽/㎠)	LIMITS (㎽/㎠)
Maximum tune up tolerance	1 880.00	25.50	5.09	0.116 271	1

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

Mode: CDMA850 1xEV-DO

Channel	Channel Frequency (㎒)	Measured E.R.P. (dB m)	Duty Cycle (%)	Power Density at 20 ㎝ (㎽/㎠)	LIMITS (㎽/㎠)
Low	824.70	23.99	100	0.049 857	0.549 80
Middle	836.52	23.43	100	0.043 826	0.557 68
High	848.31	24.68	100	0.058 443	0.565 54

Mode	Channel Frequency (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	LIMITS (㎽/㎠)
Maximum tune up tolerance	848.31	25.50	2.99	0.071 692	0.565 54

Mode: CDMA1900 1xEV-DO

Channel	Channel Frequency (㎒)	Measured E.I.R.P. (dB m)	Duty Cycle (%)	Power Density at 20 ㎝ (㎽/㎠)	LIMITS (㎽/㎠)
Low	1 851.25	26.64	100	0.091 776	1
Middle	1 880.00	27.58	100	0.113 954	1
High	1 908.75	26.83	100	0.095 880	1

Mode	Channel Frequency (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	LIMITS (㎽/㎠)
Maximum tune up tolerance	1 880.00	25.50	5.09	0.116 271	1

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

WLAN

11b mode

Channel	Channel Frequency (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	LIMITS (㎽/㎠)
Low	2 412	15.61	3.08	0.014 714	1
Middle	2 437	16.10	3.08	0.016 471	1
High	2 462	16.48	3.08	0.017 978	1
Maximum tune up tolerance	2 462	18.00	3.08	0.025 511	1

11g mode

Channel	Channel Frequency (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	LIMITS (㎽/㎠)
Low	2 412	11.81	3.08	0.006 134	1
Middle	2 437	11.88	3.08	0.006 233	1
High	2 462	11.64	3.08	0.005 898	1
Maximum tune up tolerance	2 437	14.00	3.08	0.010 156	1

11n mode

Channel	Channel Frequency (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	LIMITS (㎽/㎠)
Low	2 412	11.85	3.08	0.006 191	1
Middle	2 437	11.71	3.08	0.005 994	1
High	2 462	12.05	3.08	0.006 482	1
Maximum tune up tolerance	2 462	14.00	3.08	0.010 156	1

Note :

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

BT

GFSK

Channel	Channel Frequency (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	LIMITS (㎽/㎠)
Low	2 402	1.59	-3.26	0.000 135	1
Middle	2 441	0.97	-3.26	0.000 117	1
High	2 480	1.52	-3.26	0.000 133	1
Maximum tune up tolerance	2 480	4.00	-3.26	0.000 236	1

π/4DQPSK

Channel	Channel Frequency (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	LIMITS (㎽/㎠)
Low	2 402	0.47	-3.26	0.000 105	1
Middle	2 441	-0.15	-3.26	0.000 097	1
High	2 480	0.48	-3.26	0.000 105	1
Maximum tune up tolerance	2 480	4.00	-3.26	0.000 236	1

8DPSK

Channel	Channel Frequency (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	LIMITS (㎽/㎠)
Low	2 402	0.47	-3.26	0.000 105	1
Middle	2 441	-0.08	-3.26	0.000 092	1
High	2 480	0.52	-3.26	0.000 106	1
Maximum tune up tolerance	2 480	4.00	-3.26	0.000 236	1

Note :

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