TEST REPORT

of

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

FCC ID: TQ8- ATC40D3AN

Equipment Under Test	:	DIGITAL CAR AVN SYSTEM
Model Name	:	ATC40D3AN
Applicant	:	Hyundai MOBIS Co., Ltd.
Manufacturer	:	Hyundai MOBIS Co., Ltd.
Date of Test(s)	:	2014.11.13 ~ 2014.12.02
Date of Issue	:	2014.12.05

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

Tested By: **Wonjun Sim** **Date:** **2014.12.05**

Approved By: **Hyunchae You** **Date:** **2014.12.05**

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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.
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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-Hoon
Phone No. : + 82 31 260 0098

1.3. Description of EUT

Kind of Product	DIGITAL CAR AVN SYSTEM
Model Name	ATC40D3AN
Power Supply	DC 14.4 V (Vehicle Battery)
Frequency Range	CDMA 850: 824.70 ㎒ ~ 848.31 ㎒ CDMA 1 900: 1 851.25 ㎒ ~ 1 908.75 ㎒ LTE Band 4 (5 ㎒): 1 712.5 ㎒ ~ 1 752.5 ㎒ LTE Band 4 (10 ㎒): 1 715.0 ㎒ ~ 1 750.0 ㎒ LTE Band 4 (15 ㎒): 1 717.5 ㎒ ~ 1 747.5 ㎒ LTE Band 4 (20 ㎒): 1 720.0 ㎒ ~ 1 745.0 ㎒ LTE Band 13 (5 ㎒): 779.5 ㎒ ~ 784.5 ㎒ LTE Band 13 (10 ㎒): 782 ㎒ WLAN (11b/g/n_HT20) : 2 412 ㎒ ~ 2 462 ㎒
Antenna Gain	824.70 ㎒ ~ 848.31 ㎒ : 4.50 ㏈i 1 851.25 ㎒ ~ 1 908.75 ㎒ : 5.22 ㏈i 1 712.5 ㎒ ~ 1 752.5 ㎒ : 2.92 ㏈i 779.5 ㎒ ~ 784.5 ㎒ : 2.83 ㏈i 2 412 ㎒ ~ 2 462 ㎒ : 3.94 ㏈i 2 402 ㎒ ~ 2 480 ㎒ : -2.48 ㏈i

1.4. Test report revision

Revision	Report number	Date of Issue	Description
0	F690501/RF-RTL008231	2014.12.05	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 Maximum tune up tolerance

Maximum tune up power (dBm)	Antenna Gain (dBi)	Duty Cycle (%)	Power Density at 20 ㎝ (㎽/㎠)	LIMITS (㎽/㎠)
25.5	4.50	100	0.198 944	0.549 80

Mode: CDMA1900 Maximum tune up tolerance

Maximum tune up power (dBm)	Antenna Gain (dBi)	Duty Cycle (%)	Power Density at 20 ㎝ (㎽/㎠)	LIMITS (㎽/㎠)
25.5	5.22	100	0.234 817	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: LTE Band 4 Maximum tune up tolerance

Maximum tune up power (dBm)	Antenna Gain (dBi)	Duty Cycle (%)	Power Density at 20 ㎝ (㎽/㎠)	LIMITS (㎽/㎠)
25.7	2.92	100	0.144 787	1

Mode: LTE Band 13 Maximum tune up tolerance

Maximum tune up power (dBm)	Antenna Gain (dBi)	Duty Cycle (%)	Power Density at 20 ㎝ (㎽/㎠)	LIMITS (㎽/㎠)
25.7	2.83	100	0.144 818	0.519 67

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: WLAN (11b) Maximum tune up tolerance

Maximum tune up power (dB m)	Antenna Gain (dB i)	Duty Cycle (%)	Power Density at 20 ㎝ (㎽/㎠)	LIMITS (㎽/㎠)
18.00	3.94	100	0.031 098	1

Mode: WLAN (11g) Maximum tune up tolerance

Maximum tune up power (dB m)	Antenna Gain (dB i)	Duty Cycle (%)	Power Density at 20 ㎝ (㎽/㎠)	LIMITS (㎽/㎠)
14.00	3.94	98	0.012 633	1

Mode: WLAN (11n) Maximum tune up tolerance

Maximum tune up power (dB m)	Antenna Gain (dB i)	Duty Cycle (%)	Power Density at 20 ㎝ (㎽/㎠)	LIMITS (㎽/㎠)
14.00	3.94	98	0.012 633	1

Mode: BT Maximum tune up tolerance

Maximum tune up power (dB m)	Antenna Gain (dB i)	Duty Cycle (%)	Power Density at 20 ㎝ (㎽/㎠)	LIMITS (㎽/㎠)
4.00	-2.48	71	0.000 398	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 ㎽/㎠.

Simultaneous transmission MPE test exclusion

CDMA850: the ratio is 0.198 944 / 0.549 80

LTE band4: the ratio is 0.144 818 / 0.519 67

WLAN 802.11b: the ratio is 0.031 098 / 1

BT: the ratio is 0.000 398 / 1

Confirm the sum result of individual MPEs ratio is ≤ 1.0;

(0.198 944/0.549 80) + (0.144 787 / 1) + (0.031 098 / 1) + (0.000 398 / 1) = 0.672 017 ≤ 1.0

So this device meets the KDB447498 D01 v05r02 section 7.2 requirement of “Simultaneous transmission MPE test exclusion”.