MPE TEST REPORT

of

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

FCC ID: TQ8-AT240DPAN

Equipment Under Test	:	DIGITAL CAR AVNT SYSTEM
Model Name	:	AT240DPAN
Applicant	:	Hyundai MOBIS Co., Ltd.
Manufacturer	:	Hyundai MOBIS Co., Ltd.
Date of Test(s)	:	2015.03.28 ~ 2015.04.26
Date of Issue	:	2015.04.27

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

Tested By: **Youngmin Park** **Date:** **2015.04.27**

Approved By: **Hyunchae You** **Date:** **2015.04.27**

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.

INDEX

Table of Contents Page

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.

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 31 688 0901
FAX : + 82 31 688 0921

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 AVNT SYSTEM
Model Name	AT240DPAN
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 (1.4 ㎒) : 1 710.7 ㎒ ~ 1 754.3 ㎒, LTE Band 4 (3 ㎒) : 1 711.5 ㎒ ~ 1 753.5 ㎒, 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 ㎒, BT : 2 402 ㎒ ~ 2 480 ㎒, WLAN : 2 412 ㎒ ~ 2 462 ㎒
Antenna Gain	824.70 ㎒ ~ 848.31 ㎒ : 2.35 ㏈d, 1 851.25 ㎒ ~ 1 908.75 ㎒ : 5.22 ㏈i, 1 710.7 ㎒ ~ 1 754.3 ㎒ : 2.92 ㏈i, 779.5 ㎒ ~ 784.5 ㎒ : 0.68 ㏈d, 2 402 ㎒ ~ 2 480 ㎒ : 1.83 ㏈i, 2 412 ㎒ ~ 2 472 ㎒ : 2.73 ㏈i

1.4. Test report revision

Revision	Report number	Date of Issue	Description
0	F690501/RF-RTL008669	2015.04.27	Initial

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.

2. RF Exposure Evaluation

2.1. Environmental evaluation and exposure limit according to FCC CFR 47 part 1, 1.1307(b), 1.1310

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/Controlled Exposure				
0.3 – 3.0	614	1.63	*100	6
3.0 – 30	1842/f	4.89/f	*900/f^2	6
30 - 300	61.4	0.163	1.0	6
300 – 1 500	-	-	f/300	6
1 500 – 100 000	-	-	5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3 – 1.34	614	1.63	*100	30
1.34 – 30	824/f	2.19/f	*180/f^2	30
30 - 300	27.5	0.073	0.2	30
300 – 1 500	-	-	**f/1500**	**30**
1 500 – 100 000	-	-	**1.0**	**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.

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.

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: CDMA 850_Maximum tune up tolerance

Channel	Channel Frequency (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB d)	Power Density at 20 ㎝ (㎽/㎠)	LIMITS (㎽/㎠)
1013	824.70	25.5	2.35	0.121 264	0.549 800

Mode: CDMA 1 900_Maximum tune up tolerance

Channel	Channel Frequency (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	LIMITS (㎽/㎠)
25	1 851.25	25.5	5.22	0.234 817	1

Mode: LTE Band 4_Maximum tune up tolerance

Channel	Channel Frequency (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	LIMITS (㎽/㎠)
20175	1 710.7	25.7	2.92	0.144 787	1

Mode: LTE Band 13_Maximum tune up tolerance

Channel	Channel Frequency (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB d)	Power Density at 20 ㎝ (㎽/㎠)	LIMITS (㎽/㎠)
23205	779.5	25.7	0.68	0.086 443	0.519 667

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

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.

Mode: BT (GFSK)_Maximum tune up tolerance

Channel	Channel Frequency (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
0	2 402	4	1.83	0.000 762	1

Mode: BT (8DPSK)_Maximum tune up tolerance

Channel	Channel Frequency (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
0	2 402	1	1.83	0.000 382	1

Mode : WLAN (11b)_Maximum tune up tolerance

Channel	Channel Frequency (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
1	2 412	18	2.73	0.023 536	1

Mode : WLAN (11g)_Maximum tune up tolerance

Channel	Channel Frequency (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
1	2 412	14	2.73	0.009 370	1

Mode : WLAN (11n)_Maximum tune up tolerance

Channel	Channel Frequency (㎒)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 ㎝ (㎽/㎠)	Limits (㎽/㎠)
1	2 412	14	2.73	0.009 370	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 ㎽/㎠.

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.

Simultaneous transmission MPE test exclusion

CDMA 850 : the ratio is 0.121 264 / 0.549 80

LTE Band 13 : the ratio is 0.086 443 / 0.519 67

BT : the ratio is 0.000 762 / 1

WLAN 802.11b : the ratio is 0.023 536 / 1

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

(0.121 264 / 0.549 80) + (0.086 443 / 0.519 67) + (0.000 762 / 1) + (0.023 536 / 1) = 0.411 200 ≤ 1.0

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

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.