

# TEST REPORT

of

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

FCC ID: TQ8-ATC41A8AN

Equipment Under Test : DIGITAL CAR AVN SYSTEM  
Model Name : ATC41A8AN  
Variant Model Names : AVC41D5AN, ATC40A8AN, ATC43A8AN, ATC44A8AN  
Applicant : Hyundai Mobis Co., Ltd.  
Manufacturer : Hyundai Mobis Co., Ltd.  
Date of Receipt : 2018.01.02  
Date of Test(s) : 2018.02.03 ~ 2018.02.07  
Date of Issue : 2018.02.09

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

Tested By:



Jinhyoung Cho

Date:

2018.02.09

Technical  
Manager:



Jungmin Yang

Date:

2018.02.09

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**SGS Korea Co., Ltd. (Gunpo Laboratory)** 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807 <http://www.sgsgroup.kr>

## 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, 15807

-Designation number: KR0150

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, 06141, South Korea

Contact Person : Choe, Seung-Hoon

Phone No. : +82 31 260 0098

### 1.3. Details of manufacturer

Company : Same as applicant

Address : Same as applicant

### 1.4. Description of EUT

<b>Kind of Product</b>	DIGITAL CAR AVN SYSTEM
<b>Model Name</b>	ATC41A8AN
<b>Variant Model Names</b>	AVC41D5AN, ATC40A8AN, ATC43A8AN, ATC44A8AN
<b>Power Supply</b>	DC 14.4 V
<b>Frequency Range</b>	2 402 MHz ~ 2 480 MHz (Bluetooth)
<b>Modulation Technique</b>	GFSK, $\pi/4$ DQPSK, 8DPSK
<b>Number of Channels</b>	79 channels
<b>Antenna Type</b>	Dielectric Chip Antenna
<b>Antenna Gain</b>	-0.10 dB i

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### 1.5. Information of Variant Models

Model name		H/W difference
Basic model	ATC41A8AN	Basic + OBC WAKE UP
Variant models	AVC41D5AN	Basic
	ATC40A8AN	Basic
	ATC43A8AN	Basic
	ATC44A8AN	Basic + OBC WAKE UP

### 1.6. Test report revision

Revision	Report number	Date of Issue	Description
0	F690501/RF-RTL012355	2018.02.09	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

#### 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/Controlled Exposure				
0.3-3.0	614	1.63	*100	6
3.0-30	1842/f	4.89/f	*900/f <sup>2</sup>	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 <sup>2</sup>	30
30-300	27.5	0.073	0.2	30
<b><u>300-1 500</u></b>	-	-	<b><u>f/1500</u></b>	<b><u>30</u></b>
<b><u>1 500-100 000</u></b>	-	-	<b><u>1.0</u></b>	<b><u>30</u></b>

#### 2.1.1. Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where  $P_d$  = power density in  $mW/cm^2$

$P_{out}$  = 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,  $1 mW/cm^2$ . 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

#### Bluetooth

##### - Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 cm (mW/cm <sup>2</sup> )	Limits (mW/cm <sup>2</sup> )
2 402 ~ 2 480	4	-0.10	0.000 488	1

#### CDMA - BC0

##### - Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 cm (mW/cm <sup>2</sup> )	Limits (mW/cm <sup>2</sup> )
824 ~ 849	25	0.89	0.077 220	0.55

#### CDMA - BC1

##### - Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 cm (mW/cm <sup>2</sup> )	Limits (mW/cm <sup>2</sup> )
1 850 ~ 1 910	25	3.20	0.131 441	1

#### LTE - Band 4

##### - Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 cm (mW/cm <sup>2</sup> )	Limits (mW/cm <sup>2</sup> )
1 710 ~ 1 755	25.70	1.43	0.102 738	1

#### LTE - Band 13

##### - Maximum tune up tolerance

Frequency Range (MHz)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 cm (mW/cm <sup>2</sup> )	Limits (mW/cm <sup>2</sup> )
777 ~ 787	25.70	1.48	0.103 927	0.52

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**Note:**

- 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>.
- This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment.
- This equipment should be installed and operated with minimum 20 cm between the radiator and your body.
- The antenna gain of this transmitter is less than 6 dBi and must not be collocated or operating in conjunction with any other antenna or transmitter unless authorized to do so by the FCC.

**Simultaneous transmission of MPE test exclusion for worst case configuration.**

Bluetooth: the ratio is 0.000 488 / 1

LTE Band 13: the ratio is 0.103 927 / 0.52

Confirm the sum result of individual MPEs ratio is  $\leq 1.0$ ;

Bluetooth + LTE:  $(0.000\ 488 / 1) + (0.103\ 927 / 0.52) = 0.200\ 348 \leq 1.0$

So this device meets the KDB447498 D01 v06 section 7.2 requirement of "Simultaneous transmission MPE test exclusion"

**Note:**

- Between CDMA and LTE, LTE is chosen as worst case.
- CDMA and LTE do not transmit simultaneously.

**- End of the Test Report -**

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A4(210 mm x 297 mm)