

TEST REPORT

of

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

FCC ID: TQ8-DA350GYAN

Equipment Under Test : DISPLAY CAR SYSTEM
Model Name : DA350GYAN
Variant Model Name(s) : Refer to the page 3
Applicant : Hyundai Mobis Co., Ltd.
Manufacturer : Hyundai Mobis Co., Ltd.
Date of Receipt : 2021.02.17
Date of Test(s) : 2021.03.02 ~ 2021.03.30
Date of Issue : 2021.04.01

In the configuration tested, the EUT complied with the standards specified above. This test report does not assure KOLAS accreditation.

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- 2) The SGS Korea is not responsible for the sampling, the results of this test report apply to the sample as received.
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Tested by:



Nancy Park

Technical
Manager:

Jinhyoung Cho

SGS Korea Co., Ltd. Gunpo Laboratory



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1. General Information

1.1. Testing Laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)

- 10-2, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
- 4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
- Designation number: KR0150

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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, South Korea, 135-977

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

Kind of Product	DISPLAY CAR SYSTEM
Model Name	DA350GYAN
Variant Model Names	DA350GYGG, DA350GYEG, DA351GYGG, DA352GYGG, DA350GYMG, DA350GYGP, DA350GYEP, DA351GYEP, DA352GYEP, DA353GYEP, DA350GYGN, DA350GYFN, DA350GYGL, DA350GYBB, DA350GYUG
Power Supply	DC 14.4 V
Frequency Range	2 402 MHz ~ 2 480 MHz (Bluetooth) 2 412 MHz ~ 2 462 MHz (11b/g/n_HT20) 5 180 MHz ~ 5 240 MHz (Band 1: 11a/n_HT20, 11ac_VHT20) 5 190 MHz ~ 5 230 MHz (Band 1: 11n_HT40, 11ac_VHT40) 5 210 MHz (Band 1: 11ac_VHT80) 5 260 MHz ~ 5 320 MHz (Band 2A: 11a/n_HT20, 11ac_VHT20) 5 270 MHz ~ 5 310 MHz (Band 2A: 11n_HT40, 11ac_VHT40) 5 290 MHz (Band 2A: 11ac_VHT80) 5 500 MHz ~ 5 720 MHz (Band 2C: 11a/n_HT20, 11ac_VHT20) 5 510 MHz ~ 5 710 MHz (Band 2C: 11n_HT40, 11ac_VHT40) 5 530 MHz ~ 5 690 MHz (Band 2C: 11ac_VHT80) 5 745 MHz ~ 5 825 MHz (Band 3: 11a/n_HT20, 11ac_VHT20) 5 755 MHz ~ 5 795 MHz (Band 3: 11n_HT40, 11ac_VHT40) 5 775 MHz (Band 3: 11ac_VHT80)
Modulation Technique	DSSS, OFDM, GFSK, $\pi/4$ DQPSK, 8DPSK
Number of Channels	79 channels (Bluetooth) 11 channels (11b/g/n_HT20) 4 channels (Band 1: 11a/n_HT20, 11ac_VHT20) 2 channels (Band 1: 11n_HT40, 11ac_VHT40) 1 channel (Band 1: 11ac_VHT80) 4 channels (Band 2A: 11a/n_HT20, 11ac_VHT20) 2 channels (Band 2A: 11n_HT40, 11ac_VHT40) 1 channel (Band 2A: 11ac_VHT80) 9 channels (Band 2C: 11a/n_HT20, 11ac_VHT20) 4 channels (Band 2C: 11n_HT40, 11ac_VHT40) 2 channels (Band 2C: 11ac_VHT80) 5 channels (Band 3: 11a/n_HT20, 11ac_VHT20) 2 channels (Band 3: 11n_HT40, 11ac_VHT40) 1 channel (Band 3: 11ac_VHT80)
Antenna Type	Pattern antenna
Antenna Gain	2 400 MHz ~ 2 483.5 MHz: -0.18 dB i (Bluetooth) 2 400 MHz ~ 2 483.5 MHz: -0.01 dB i (WLAN 2.4 G) 5 150 MHz ~ 5 250 MHz: -0.61 dB i (WLAN 5 G) 5 250 MHz ~ 5 350 MHz: -0.18 dB i (WLAN 5 G) 5 470 MHz ~ 5 725 MHz: -0.77 dB i (WLAN 5 G) 5 725 MHz ~ 5 850 MHz: -0.18 dB i (WLAN 5 G)
H/W Version	1.0
S/W Version	1.0

1.5. Test Report Revision

Revision	Report Number	Date of Issue	Description
0	F690501-RF-RTL001882	2021.04.01	Initial

1.6. Information of Variant Models

Model Names		Description							
		Marketing Area	Code	Linked to ECALL	HD	LHD/RHD	RDS	FREQUENCY RANGE	CHANNEL SPACE
Basic Model	DA350GYAN	U.S.A	A2	X	O	LHD	O	87.5~107.9 MHz 530 ~ 1 710 kHz	200 kHz 10 kHz
Variant Models	DA350GYGG	GENERAL	A1	X	X	LHD	X	87.5~108.0 MHz 531 ~ 1 602 kHz	100 kHz 9 kHz
	DA350GYEG	EU		X	X		X		
	DA351GYGG	GENERAL		X	X		O		
	DA352GYGG	GENERAL		O	X		O		
	DA350GYMG	MID EAST		X	X		X		
	DA350GYGP	GENERAL	A8	X	X	LHD	X	87.5~108.0 MHz 522 ~ 1 620 kHz	100 kHz 9 kHz
	DA350GYEP	EU		X	X		X		
	DA351GYEP	EU		X	X		O		
	DA352GYEP	EAST EU		O	X		O		
	DA353GYEP	EU		O	X		O		
	DA350GYGN	GENERAL	A2	X	X	LHD	X	87.5~107.9 MHz 530 ~ 1 710 kHz	200 kHz 10 kHz
	DA350GYFN	MEXICO		X	O		X		
	DA350GYGL	COLOMBIA	A5	X	X	LHD	X	87.5~107.9 MHz 530 ~ 1 710 kHz	100 kHz 10 kHz
DA350GYBB	BRAZIL	A7	X	X	LHD	X	76.1~107.9 MHz 530 ~ 1 710 kHz	100 kHz 10 kHz	
DA350GYUG	AUSTRALIA	A6	X	X	RHD	X	87.5~108.0 MHz 531 ~ 1 701 kHz	100 kHz 9 kHz	

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 ²)	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
<u>1 500-100 000</u>	-	-	<u>1.0</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/cm^2

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, $1 mW/cm^2$. 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.

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 ²)	Limits (mW/cm ²)
2 400 ~ 2 483.5	4	-0.18	0.000 479	1

WLAN (2.4G)

- 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 ²)	Limits (mW/cm ²)
2 400 ~ 2 483.5	6	-0.01	0.000 790	1

WLAN (5G)

- 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 ²)	Limits (mW/cm ²)
5 150 ~ 5 250	10	-0.61	0.001 729	1
5 250 ~ 5 350	10	-0.18	0.001 909	1
5 470 ~ 5 725	7	-0.77	0.000 835	1
5 725 ~ 5 850	4.5	-0.18	0.000 538	1

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/cm².
- 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 dB i and must not be collocated or operating in conjunction with any other antenna or transmitter unless authorized to do so by the FCC.
- According to KDB 447498 D01 RF Exposure Guidance 4.1.



SGS Korea Co., Ltd.

4, LS-ro 182beon-gil, Gunpo-si, Gyeonggi-do, Korea, 15807
Tel. +82 31 428 5700 / Fax. +82 31 427 2370
<http://www.sgsgroup.kr>

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Simultaneous transmission of RF Exposure test exclusion for worst case configuration.

Bluetooth: the ratio is 0.000 479 / 1

WLAN: the ratio is 0.001 909 / 1

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

Bluetooth + WLAN: $(0.000\ 479 / 1) + (0.001\ 909 / 1) = 0.002\ 388 \leq 1.0$

- End of the Test Report -