

MPE TEST REPORT

of

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

FCC ID: TQ8-TS310B1AX

Equipment Under Test : Premium Gen 2.0 I-BOX
Model Name : TS310B1AX
Serial No. : N/A
Applicant : HYUNDAI MOBIS CO., LTD.
Manufacturer : HYUNDAI MOBIS CO., LTD.
Date of Test(s) : 2013.01.15 ~ 2013.01.15
Date of Issue : 2013.03.06

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

Tested By:



Logan Lee

Date

2013.03.06

Approved By:



Denny Ham

Date

2013.03.06

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1. General Information

1.4. Testing Laboratory

SGS Korea Co., Ltd. (Gunpo Laboratory)

- Wireless Div. 3FL, 18-34, Sanbon-dong, Gunpo-si, Gyeonggi-do, Korea 435-040

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 : 80-9, Mabook-Dong, Giheung-Gu, Yongin-shi, Gyeonggi-Do, 446-912, South Korea

Contact Person : Kim, Jong-Tae

Phone No. : +82 31 260 0092

1.3. Description of EUT

Kind of Product	Premium Gen 2.0 I-BOX
Model Name	TS310B1AX
Serial Number	N/A
Power Supply	DC 14.4 V (Vehicle Battery)
Frequency Range	2 412 MHz ~ 2 462 MHz (11b/g/n_HT20)
Modulation Technique	DSSS, OFDM
Number of Channels	11 channels (11b/g/n_HT20)
Antenna Type	Lead wire rod type
Antenna Gain	2 412 MHz ~ 2 462 MHz: 2.94 dB i

1.4. Test report revision

Revision	Report number	Description
0	F690501/RF-RTL006160	Initial
1	F690501/RF-RTL006160-1	Added MPE data of maximum tune up tolerance

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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

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 (MHz)	Electric Field Strength(V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)	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	6
<u>1 500 – 100 000</u>	--	--	<u>1</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/cm²

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/cm². 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

11b mode

Channel	Channel Frequency (MHz)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	LIMITS (mW/cm ²)
Low	2 412	14.70	2.94	0.011 554	1
Middle	2 437	14.88	2.94	0.012 043	1
High	2 462	14.86	2.94	0.011 988	1

Mode	Channel Frequency (MHz)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	LIMITS (mW/cm ²)
Maximum tune up tolerance	2 437	18.00	2.94	0.024 702	1

11g mode

Channel	Channel Frequency (MHz)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	LIMITS (mW/cm ²)
Low	2 412	10.60	2.94	0.004 495	1
Middle	2 437	10.78	2.94	0.004 685	1
High	2 462	10.70	2.94	0.004 600	1

Mode	Channel Frequency (MHz)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	LIMITS (mW/cm ²)
Maximum tune up tolerance	2 437	14.00	2.94	0.009 834	1

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11n mode

Channel	Channel Frequency (MHz)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	LIMITS (mW/cm ²)
Low	2 412	10.55	2.94	0.004 444	1
Middle	2 437	10.35	2.94	0.004 244	1
High	2 462	10.48	2.94	0.004 373	1

Mode	Channel Frequency (MHz)	Output Average Power to Antenna (dB m)	Antenna Gain (dB i)	Power Density at 20 cm (mW/cm ²)	LIMITS (mW/cm ²)
Maximum tune up tolerance	2 412	14.00	2.94	0.009 834	1

Note :

1. 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.

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