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TEST REPORT

FCC MPE Test for ATB31EYAN&ATB31EYKN

Certification

APPLICANT
HYUNDAI MOBIS CO., LTD.

REPORT NO.
HCT-RF-1909-FI005

DATE OF ISSUE
September 06, 2019

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TEST REPORT

FCC MPE Test for ATB31EYAN& ATB31EYKN

REPORT NO.
HCT-RF-1909-FI005

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Other Model
FCC: ATB30EYAN

Applicant	**HYUNDAI MOBIS CO., LTD.** 203, Teheran-ro, Gangnam-gu, Seoul, 135-977, South Korea
Eut Type Model Name	Car Audio System ATB31EYAN
FCC ID	TQ8-ATB31EYAN
Date of Receipt	July 04, 2019
Frequency range	2402 MHz - 2480 MHz (Bluetooth) 2 412 MHz ~ 2 462 MHz (WLAN) 5180 MHz - 5825 MHz (UNII)

This test results were applied only to the test methods required by the standard.

Tested by
Se Wook Park (signature)

Technical Manager
Seul Ki Lee (signature)

HCT CO., LTD.
Soo Chan Lee
SooChan Lee / CEO

REVISION HISTORY

The revision history for this test report is shown in table.

Revision No.	Date of Issue	Description
0	September 06, 2019	Initial Release

The measurements shown in this report were made in accordance with the procedures specified in § 2.947. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them.

HCT CO., LTD. Certifies that no party to this application has subject to a denial of Federal benefits that includes FCC benefits pursuant to section 5301 of the Anti-Drug Abuse Act of 1998,21 U.S. C.853(a)

RF Exposure Statement

1. Limit

According to § 1.1310, § 2.1091 RF exposure is calculated.

(B) Limits for General Population/Uncontrolled Exposures

Frequency range (MHz)	Electric field Strength (V/m)	Magnetic field Strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
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 - 1500	……...	……...	f/1500	30
1500 - 100.000	……...	……...	1.0	30

F = frequency in MHz

* = Plane-wave equivalent power density

2. Maximum Permissible Exposure Prediction

Prediction of MPE limit at a given distance

$$S = PG/4\pi R^2$$

S = Power density

P = Power input to antenna

G = Power gain to the antenna in the direction of interest relative to an isotropic radiator

R = Distance to the center of radiation of the antenna

3. RESULTS

3-1. Bluetooth

Average output Power at antenna input terminal	4.00	dBm
Average output Power at antenna input terminal	2.51	mW
Prediction distance	20.00	cm
Prediction frequency	2402 – 2480	MHz
Antenna Gain(typical)	0.29	dBi
Antenna Gain(numeric)	1.069	-
Power density at prediction frequency(S)	0.00053	mW/cm^2
MPE limit for uncontrolled exposure at prediction frequency	1.000	mW/cm^2

2.1091

EIRP	4.00	(dBm)
ERP	2.14	(dBm)
ERP	0.002	(W)
ERP Limit	3.00	(W)
MARGIN	32.63	(dB)

3-2. DTS

Average output Power at antenna input terminal	10.00	dBm
Average output Power at antenna input terminal	10.00	mW
Prediction distance	20.00	cm
Prediction frequency	2412 – 2462	MHz
Antenna Gain(typical)	-0.70	dBi
Antenna Gain(numeric)	0.751	-
Power density at prediction frequency(S)	0.00169	mW/cm^2
MPE limit for uncontrolled exposure at prediction frequency	1.000	mW/cm^2

2.1091

EIRP	9.30	(dBm)
ERP	7.15	(dBm)
ERP	0.005	(W)
ERP Limit	3.00	(W)
MARGIN	27.62	(dB)

3-3. UNII

Average output Power at antenna input terminal	10.00	dBm
Average output Power at antenna input terminal	10.00	mW
Prediction distance	20.00	cm
Prediction frequency	5180 - 5825	MHz
Antenna Gain(typical)	3.510	dBi
Antenna Gain(numeric)	2.244	-
Power density at prediction frequency(S)	0.00446	mW/cm^2
MPE limit for uncontrolled exposure at prediction frequency	1.000	mW/cm^2

2.1091

EIRP	13.51	(dBm)
ERP	11.36	(dBm)
ERP	0.014	(W)
ERP Limit	3.00	(W)
MARGIN	23.41	(dB)

3-4. CDMA BC0

Average output Power at antenna input terminal	25.00	dBm
Average output Power at antenna input terminal	316.23	mW
Prediction distance	20.000	cm
Prediction frequency	824-849	MHz
Cable Loss	-1.71	dB
Antenna Gain(typical)	3.850	dBi
Antenna Gain(numeric)	2.427	-
Power density at prediction frequency(S)	0.15266	mW/cm^2
MPE limit for uncontrolled exposure at prediction frequency	0.549	mW/cm^2

2.1091

EIRP	28.85	(dBm)
ERP	26.70	(dBm)
ERP	0.47	(W)
ERP Limit	1.50	(W)
MARGIN	5.06	(dB)

3-5. CDMA BC1

Average output Power at antenna input terminal	25.00	dBm
Average output Power at antenna input terminal	316.23	mW
Prediction distance	20.000	cm
Prediction frequency	1850-1910	MHz
Cable Loss	-3.300	dB
Antenna Gain(typical)	2.910	dBi
Antenna Gain(numeric)	1.954	-
Power density at prediction frequency(S)	0.12295	mW/cm^2
MPE limit for uncontrolled exposure at prediction frequency	1.000	mW/cm^2

2.1091

EIRP	27.91	(dBm)
ERP	25.76	(dBm)
ERP	0.377	(W)
ERP Limit	3.00	(W)
MARGIN	9.01	(dB)

3-6. LTE B4

Average output Power at antenna input terminal	24.00	dBm
Average output Power at antenna input terminal	251.19	mW
Prediction distance	20.000	cm
Prediction frequency	1710-1755	MHz
Cable Loss	-3.300	dB
Antenna Gain(typical)	2.280	dBi
Antenna Gain(numeric)	1.690	-
Power density at prediction frequency(S)	0.08448	mW/cm^2
MPE limit for uncontrolled exposure at prediction frequency	1.000	mW/cm^2

2.1091

EIRP	26.28	(dBm)
ERP	24.13	(dBm)
ERP	0.259	(W)
ERP Limit	3.00	(W)
MARGIN	10.64	(dB)

3-7. LTE B13

Average output Power at antenna input terminal	24.00	dBm
Average output Power at antenna input terminal	251.19	mW
Prediction distance	20.000	cm
Prediction frequency	777-787	MHz
Cable Loss	-1.710	dB
Antenna Gain(typical)	2.780	dBi
Antenna Gain(numeric)	1.897	-
Power density at prediction frequency(S)	0.09478	mW/cm^2
MPE limit for uncontrolled exposure at prediction frequency	0.518	mW/cm^2

2.1091

EIRP	26.78	(dBm)
ERP	24.63	(dBm)
ERP	0.29	(W)
ERP Limit	1.50	(W)
MARGIN	7.13	(dB)

3-8. LTE B5

Average output Power at antenna input terminal	24.00	dBm
Average output Power at antenna input terminal	251.19	mW
Prediction distance	20.000	cm
Prediction frequency	824-849	MHz
Cable Loss	-1.71	dB
Antenna Gain(typical)	3.850	dBi
Antenna Gain(numeric)	2.427	-
Power density at prediction frequency(S)	0.12126	mW/cm^2
MPE limit for uncontrolled exposure at prediction frequency	0.549	mW/cm^2

2.1091

EIRP	27.85	(dBm)
ERP	25.70	(dBm)
ERP	0.37	(W)
ERP Limit	1.50	(W)
MARGIN	6.06	(dB)

3-9. LTE B2

Average output Power at antenna input terminal	24.00	dBm
Average output Power at antenna input terminal	251.19	mW
Prediction distance	20.000	cm
Prediction frequency	1850-1910	MHz
Cable Loss	-3.300	dB
Antenna Gain(typical)	2.910	dBi
Antenna Gain(numeric)	1.954	-
Power density at prediction frequency(S)	0.09766	mW/cm^2
MPE limit for uncontrolled exposure at prediction frequency	1.000	mW/cm^2

2.1091

EIRP	26.91	(dBm)
ERP	24.76	(dBm)
ERP	0.299	(W)
ERP Limit	3.00	(W)
MARGIN	10.01	(dB)

Worst Case: Simultaneous MPE 20cm is

5G WLAN (0.00446) +BT (0.00053) + CDMA BC0 (0.15266/0.549) + LTE B5 (0.12126/0.549) = 0.503934 < 1