

TEST REPORT

FCC MPE Test for ATB41HSAN

Certification

APPLICANT
HYUNDAI MOBIS CO., LTD.

REPORT NO.
HCT-RF-2003-FI010

DATE OF ISSUE
March 20, 2020

HCT Co., Ltd.

74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383 KOREA
Tel. +82 31 634 6300 F ax. +82 31 645 6401



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Additional Model
ATB40HSAN

Applicant HYUNDAI MOBIS CO., LTD.
203, Teheran-ro, Gangnam-gu, Seoul, 135-977, South Korea

Eut Type Car Audio System
Model Name ATB41HSAN

FCC ID TQ8-ATB41HSAN

Date of Receipt February 05, 2020

Frequency range 2 402 MHz ~ 2 480 MHz (Bluetooth)
2 412 MHz ~ 2 462 MHz (WLAN)
5 180 MHz ~ 5 825 MHz (UNII)

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

Tested by
Jeong Ho Kim

(signature)

Technical Manager
Jong Seok 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	March 20, 2020	Initial Release

Engineering Statement:

The measurements shown in this report were made in accordance with the procedures indicated, and the emissions from this equipment were found to be within the limits applicable. I assume full responsibility for the accuracy and completeness of these measurements, and for the qualifications of all persons taking them. It is further stated that upon the basis of the measurements made, the equipment tested is capable of operation in accordance with the requirements of the FCC Rules under normal use and maintenance

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	4.000	dBm
Average output Power at antenna input terminal	2.512	mW
Prediction distance	20.00	cm
Prediction frequency	2402 – 2480	MHz
Antenna Gain(typical)	-0.380	dBi
Antenna Gain(numeric)	0.916	-
Power density at prediction frequency(S)	0.0005	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	1.000	mW/cm ²

2.1091

EIRP	3.62 (dBm)
ERP	1.47 (dBm)
ERP	0.001 (W)
ERP Limit	3.00 (W)
MARGIN	33.30 (dB)

3-2. DTS

Average output Power at antenna input terminal	10.00	dBm
Average output Power at antenna input terminal	10.000	mW
Prediction distance	20.00	cm
Prediction frequency	2412 – 2462	MHz
Antenna Gain(typical)	-1.190	dBi
Antenna Gain(numeric)	0.760	-
Power density at prediction frequency(S)	0.0015	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	1.000	mW/cm ²

2.1091

EIRP	8.81 (dBm)
ERP	6.66 (dBm)
ERP	0.005 (W)
ERP Limit	3.00 (W)
MARGIN	28.11 (dB)

3-3. UNII

Average output Power at antenna input terminal	10.00	dBm
Average output Power at antenna input terminal	10.000	mW
Prediction distance	20.00	cm
Prediction frequency	5180 - 5825	MHz
Antenna Gain(typical)	4.580	dBi
Antenna Gain(numeric)	2.871	-
Power density at prediction frequency(S)	0.0057	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	1.000	mW/cm ²

2.1091

EIRP	14.58 (dBm)
ERP	12.43 (dBm)
ERP	0.017 (W)
ERP Limit	3.00 (W)
MARGIN	22.34 (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)	0.930	dBi
Antenna Gain(numeric)	1.239	-
Power density at prediction frequency(S)	0.07793	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	0.549	mW/cm ²

2.1091

EIRP	25.93 (dBm)
ERP	23.78 (dBm)
ERP	0.24 (W)
ERP Limit	1.50 (W)
MARGIN	7.98 (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)	-1.160	dBi
Antenna Gain(numeric)	0.766	-
Power density at prediction frequency(S)	0.0482	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	1.000	mW/cm ²

2.1091

EIRP	23.84 (dBm)
ERP	21.69 (dBm)
ERP	0.148 (W)
ERP Limit	3.00 (W)
MARGIN	13.08 (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)	-1.770	dBi
Antenna Gain(numeric)	0.665	-
Power density at prediction frequency(S)	0.0332	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	1.000	mW/cm ²

2.1091

EIRP	22.23 (dBm)
ERP	20.08 (dBm)
ERP	0.102 (W)
ERP Limit	3.00 (W)
MARGIN	14.69 (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)	0.340	dBi
Antenna Gain(numeric)	1.081	-
Power density at prediction frequency(S)	0.05404	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	0.518	mW/cm ²

2.1091

EIRP	24.34 (dBm)
ERP	22.19 (dBm)
ERP	0.17 (W)
ERP Limit	1.50 (W)
MARGIN	9.57 (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)	0.930	dBi
Antenna Gain(numeric)	1.239	-
Power density at prediction frequency(S)	0.06191	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	0.549	mW/cm ²

2.1091

EIRP	24.93 (dBm)
ERP	22.78 (dBm)
ERP	0.19 (W)
ERP Limit	1.50 (W)
MARGIN	8.98 (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)	-1.160	dBi
Antenna Gain(numeric)	0.766	-
Power density at prediction frequency(S)	0.0383	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	1.000	mW/cm ²

2.1091

EIRP	22.84 (dBm)
ERP	20.69 (dBm)
ERP	0.117 (W)
ERP Limit	3.00 (W)
MARGIN	14.08 (dB)

Worst Case: Simultaneous MPE 20cm is

5G WLAN (0.0057) +BT (0.0005) + CDMA BC0 (0.07793 /0.549) + LTE B5 (0.06191/0.549)= 0.2609 < 1