

TEST REPORT

FCC MPE Test for ATC42S2AN
Certification

APPLICANT
HYUNDAI MOBIS CO., LTD.

REPORT NO.
HCT-RF-2003-FI005

DATE OF ISSUE
March 18, 2020

HCT Co., Ltd.

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**TEST
REPORT**

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Additional Model

FCC: ATC41S2AN,ATC40SCAN,ATC41SCAN,ATC42SCAN,ATC43SCAN

Applicant

HYUNDAI MOBIS CO., LTD.

203, Teheran-ro, Gangnam-gu, Seoul, 135-977, South Korea

**Eut Type
Model Name**

Car Audio System
ATC42S2AN

FCC ID

TQ8-ATC42S2AN

Date of Receipt

February 05, 2020

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

Jin Gwan Lee

(signature)

Technical Manager

Kwon Jeong

(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 18, 2020	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	4.000	dBm
Average output Power at antenna input terminal	2.512	mW
Prediction distance	20.00	cm
Prediction frequency	2402 – 2480	MHz
Antenna Gain(typical)	3.040	dBi
Antenna Gain(numeric)	2.014	-
Power density at prediction frequency(S)	0.0010	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	1.000	mW/cm ²

2.1091

EIRP	7.04 (dBm)
ERP	4.89 (dBm)
ERP	0.003 (W)
ERP Limit	3.00 (W)
MARGIN	29.88 (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)	-0.70	dBi
Antenna Gain(numeric)	0.851	-
Power density at prediction frequency(S)	0.0017	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	10.000	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)	0.0045	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)	1.290	dBi
Antenna Gain(numeric)	1.346	-
Power density at prediction frequency(S)	0.08467	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	0.549	mW/cm ²

2.1091

EIRP	26.29 (dBm)
ERP	24.14 (dBm)
ERP	0.26 (W)
ERP Limit	1.50 (W)
MARGIN	7.62 (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)	-0.780	dBi
Antenna Gain(numeric)	0.836	-
Power density at prediction frequency(S)	0.05257	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	1.000	mW/cm ²

2.1091

EIRP	24.22 (dBm)
ERP	22.07 (dBm)
ERP	0.161 (W)
ERP Limit	3.00 (W)
MARGIN	12.70 (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)	-0.990	dBi
Antenna Gain(numeric)	0.796	-
Power density at prediction frequency(S)	0.03979	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	1.000	mW/cm ²

2.1091

EIRP	23.01 (dBm)
ERP	20.86 (dBm)
ERP	0.122 (W)
ERP Limit	3.00 (W)
MARGIN	13.91 (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)	1.590	dBi
Antenna Gain(numeric)	1.442	-
Power density at prediction frequency(S)	0.07207	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	0.518	mW/cm ²

2.1091

EIRP	25.59 (dBm)
ERP	23.44 (dBm)
ERP	0.22 (W)
ERP Limit	1.50 (W)
MARGIN	8.32 (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)	1.290	dBi
Antenna Gain(numeric)	1.346	-
Power density at prediction frequency(S)	0.06726	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	0.549	mW/cm ²

2.1091

EIRP	25.29 (dBm)
ERP	23.14 (dBm)
ERP	0.21 (W)
ERP Limit	1.50 (W)
MARGIN	8.62 (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)	-0.780	dBi
Antenna Gain(numeric)	0.836	-
Power density at prediction frequency(S)	0.04176	mW/cm ²
MPE limit for uncontrolled exposure at prediction frequency	1.000	mW/cm ²

2.1091

EIRP	23.22 (dBm)
ERP	21.07 (dBm)
ERP	0.128 (W)
ERP Limit	3.00 (W)
MARGIN	13.70 (dB)

Worst Case: Simultaneous MPE 20cm is

5G WLAN (0.0045) +BT (0.0010) + CDMA BC0 (0.0847/0.549) + LTE B5 (0.0673/0.549)= 0.2824 < 1