

# FCC MPE REPORT

## Certification

**Applicant Name:**  
HYUNDAI MOBIS CO., LTD.

**Date of Issue:**  
February 18, 2019

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

**Test Site/Location:**  
HCT CO., LTD., 74, Seoicheon-ro 578beon-gil, Majang-myeon, Icheon-si, Gyeonggi-do, 17383, Rep. of KOREA

**Report No.:** HCT-RF-1902-FC005

**FCC ID:** TQ8-ATC40DWAN

**APPLICANT:** HYUNDAI MOBIS CO., LTD.

**Model:** ATC40DWAN

**Additional Model:** ATC40HTAN

**EUT Type:** Car Audio System

**Frequency Range:** 2402 MHz - 2480 MHz (Bluetooth)

2412 MHz - 2462 MHz (2.4 GHz Band)

5180 MHz - 5825 MHz (5 GHz Band)

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)



**Report prepared by : Kwon Jeong**  
Engineer of Telecommunication testing center



**Approved by : Jong Seok Lee**  
Manager of Telecommunication testing center

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## Version

TEST REPORT NO.	DATE	DESCRIPTION
HCT-RF-1902-FC005	February 18, 2019	- First Approval Report

# RF Exposure Statement

## 1. LIMITS

According to §1.1310 and §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 <sup>2</sup> )	Averaging time (minutes)
0.3 - 1.34.....	614	1.63	*(100)	30
1.34 - 30.....	824/f	2.19/f	*(180/ f <sup>2</sup> )	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 of 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	2.512	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 <sup>2</sup>
MPE limit for uncontrolled exposure at prediction frequency	1.00	mW/cm <sup>2</sup>

#### 2.1091

EIRP	4.29 (dBm)
ERP	2.14 (dBm)
ERP	0.002 (W)
ERP Limit	3.0 (W)
MARGIN	32.63 (dB)

3-2. WLAN DTS Band (802.11b,g,n)

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)	0.851	-
Power density at prediction frequency( S)	0.00169	mW/cm <sup>2</sup>
MPE limit for uncontrolled exposure at prediction frequency	1.00	mW/cm <sup>2</sup>

2.1091

EIRP	9.3 (dBm)
ERP	7.15 (dBm)
ERP	0.005 (W)
ERP Limit	3.00 (W)
MARGIN	27.62 (dB)

3-3. UNII Band 1(802.11a,n,ac)

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)	3.51	dBi
Antenna Gain(numeric)	2.244	-
Power density at prediction frequency( S)	0.00446	mW/cm <sup>2</sup>
MPE limit for uncontrolled exposure at prediction frequency	1.00	mW/cm <sup>2</sup>

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	25.700	dBm
Average output Power at antenna input terminal	371.535	mW
Prediction distance	20.000	cm
Prediction frequency	824-849	MHz
Cable Loss	-1.71	dB
Antenna Gain(typical)	2.800	dBi
Antenna Gain(numeric)	1.905	-
Power density at prediction frequency( S)	0.1408	mW/cm <sup>2</sup>
MPE limit for uncontrolled exposure at prediction frequency	0.5493	mW/cm <sup>2</sup>

2.1091

EIRP	28.50 (dBm)
ERP	26.35 (dBm)
ERP	0.43 (W)
ERP Limit	1.50 (W)
MARGIN	5.41 (dB)

3-5. CDMA BC1

Average output Power at antenna input terminal	25.700	dBm
Average output Power at antenna input terminal	371.535	mW
Prediction distance	20.000	cm
Prediction frequency	1850-1910	MHz
Cable Loss	-3.300	dB
Antenna Gain(typical)	5.230	dBi
Antenna Gain(numeric)	3.334	-
Power density at prediction frequency( S)	0.24645	mW/cm <sup>2</sup>
MPE limit for uncontrolled exposure at prediction frequency	1.000	mW/cm <sup>2</sup>

2.1091

EIRP	30.93 (dBm)
ERP	28.78 (dBm)
ERP	0.76 (W)
ERP Limit	1.50 (W)
MARGIN	2.98 (dB)



3-6. LTE B4

Average output Power at antenna input terminal	25.700	dBm
Average output Power at antenna input terminal	371.535	mW
Prediction distance	20.000	cm
Prediction frequency	1710-1755	MHz
Cable Loss	-3.300	dB
Antenna Gain(typical)	3.960	dBi
Antenna Gain(numeric)	2.489	-
Power density at prediction frequency( S)	0.18396	mW/cm <sup>2</sup>
MPE limit for uncontrolled exposure at prediction frequency	1.000	mW/cm <sup>2</sup>

2.1091

EIRP	29.66 (dBm)
ERP	27.51 (dBm)
ERP	0.56 (W)
ERP Limit	1.50 (W)
MARGIN	4.25 (dB)

3-7. LTE B13

Average output Power at antenna input terminal	25.700	dBm
Average output Power at antenna input terminal	371.535	mW
Prediction distance	20.000	cm
Prediction frequency	777-787	MHz
Cable Loss	-1.710	dB
Antenna Gain(typical)	1.380	dBi
Antenna Gain(numeric)	1.374	-
Power density at prediction frequency( S)	0.10156	mW/cm <sup>2</sup>
MPE limit for uncontrolled exposure at prediction frequency	0.5180	mW/cm <sup>2</sup>

2.1091

EIRP	27.08 (dBm)
ERP	24.93 (dBm)
ERP	0.31 (W)
ERP Limit	1.50 (W)
MARGIN	6.83 (dB)

3-8. LTE B5

Average output Power at antenna input terminal	25.700	dBm
Average output Power at antenna input terminal	371.535	mW
Prediction distance	20.000	cm
Prediction frequency	824-849	MHz
Cable Loss	-1.71	dB
Antenna Gain(typical)	2.800	dBi
Antenna Gain(numeric)	1.905	-
Power density at prediction frequency( S)	0.1408	mW/cm <sup>2</sup>
MPE limit for uncontrolled exposure at prediction frequency	0.5493	mW/cm <sup>2</sup>

2.1091

EIRP	28.50 (dBm)
ERP	26.35 (dBm)
ERP	0.43 (W)
ERP Limit	1.50 (W)
MARGIN	5.41 (dB)

3-9. LTE B2

Average output Power at antenna input terminal	25.700	dBm
Average output Power at antenna input terminal	371.535	mW
Prediction distance	20.000	cm
Prediction frequency	1850-1910	MHz
Cable Loss	-3.300	dB
Antenna Gain(typical)	5.23	dBi
Antenna Gain(numeric)	3.334	-
Power density at prediction frequency( S)	0.24645	mW/cm <sup>2</sup>
MPE limit for uncontrolled exposure at prediction frequency	1.000	mW/cm <sup>2</sup>

2.1091

EIRP	30.93 (dBm)
ERP	28.78 (dBm)
ERP	0.76 (W)
ERP Limit	1.50 (W)
MARGIN	2.98 (dB)

**Worst Case: Simultaneous MPE 20cm is**

$$5G\ WLAN\ (0.00446) + BT\ (0.00053) + CDMA\ BC0\ (0.1408/0.5493) + LTE\ B2\ (0.24645) = 0.507766 < 1$$