

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

This report only responds to the tested sample and may not be reproduced, except in full, without written approval of the HCT Co., Ltd.

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 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 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 | dB |
| Antenna Gain(numeric) | 1.069 | - |
| Power density at prediction frequency(S) | 0.00053 | mW/cm ² |
| MPE limit for uncontrolled exposure at prediction frequency | 1.00 | mW/cm ² |

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 ² |
| MPE limit for uncontrolled exposure at prediction frequency | 1.00 | mW/cm ² |

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 ² |
| MPE limit for uncontrolled exposure at prediction frequency | 1.00 | 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 | 25.700 | 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 | dB |
| Antenna Gain(numeric) | 1.905 | - |
| Power density at prediction frequency(S) | 0.1408 | mW/cm ² |
| MPE limit for uncontrolled exposure at prediction frequency | 0.5493 | mW/cm ² |

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 ² |
| MPE limit for uncontrolled exposure at prediction frequency | 1.000 | mW/cm ² |

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 ² |
| MPE limit for uncontrolled exposure at prediction frequency | 1.000 | mW/cm ² |

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 ² |
| MPE limit for uncontrolled exposure at prediction frequency | 0.5180 | mW/cm ² |

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 ² |
| MPE limit for uncontrolled exposure at prediction frequency | 0.5493 | mW/cm ² |

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 ² |
| MPE limit for uncontrolled exposure at prediction frequency | 1.000 | mW/cm ² |

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