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TEST REPORT

FCC MPE Test for VT230SNAN

APPLICANT
HYUNDAI MOBIS CO., LTD.

REPORT NO.
HCT-RF-2007-FI009-R1

DATE OF ISSUE
12 August 2020

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Additional Model
-

Applicant	**HYUNDAI MOBIS CO., LTD.** 203, Teheran-ro, Gangnam-gu, Seoul, 135-977, South Korea
Eut Type Model Name	Car Audio System VT230SNAN
FCC ID	TQ8-VT230SNAN
Frequency range	2 402 MHz – 2 480 MHz (Bluetooth) 2 412 MHz ~ 2 462 MHz (WLAN) 5 180 MHz ~ 5 825 MHz (UNII)

The result shown in this test report refer only to the sample(s) tested unless otherwise stated.
This test results were applied only to the test methods required by the standard.

REVISION HISTORY

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

Revision No.	Date of Issue	Description
0	July 24, 2020	Initial Release
1	August 12, 2020	Licensed Band MPE Revised.(On Page 8~13)

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)	0.17	dBi
Antenna Gain(numeric)	1.040	-
Power density at prediction frequency(S)	0.0005	mW/cm^2
MPE limit for uncontrolled exposure at prediction frequency	1.0000	mW/cm^2

2.1091

EIRP	4.17	(dBm)
ERP	2.02	(dBm)
ERP	0.002	(W)
ERP Limit	3.00	(W)
MARGIN	32.75	(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)	0.83	dBi
Antenna Gain(numeric)	1.211	-
Power density at prediction frequency(S)	0.0024	mW/cm^2
MPE limit for uncontrolled exposure at prediction frequency	1.0000	mW/cm^2

2.1091

EIRP	10.83	(dBm)
ERP	8.68	(dBm)
ERP	0.007	(W)
ERP Limit	3.00	(W)
MARGIN	26.09	(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)	2.05	dBi
Antenna Gain(numeric)	1.603	-
Power density at prediction frequency(S)	0.0032	mW/cm^2
MPE limit for uncontrolled exposure at prediction frequency	1.0000	mW/cm^2

2.1091

EIRP	12.05	(dBm)
ERP	9.90	(dBm)
ERP	0.010	(W)
ERP Limit	3.00	(W)
MARGIN	24.87	(dB)

3-4. CDMA BC0

Average output Power at antenna input terminal	25.70	dBm
Average output Power at antenna input terminal	371.54	mW
Prediction distance	20.000	cm
Prediction frequency	824-849	MHz
Cable Loss	-1.71	dB
Antenna Gain(typical)	2.80	dBi
Antenna Gain(final : Cable Loss + Antenna Gain)	1.09	dBi
Antenna Gain(numeric)	1.285	-
Power density at prediction frequency(S)	0.0950	mW/cm^2
MPE limit for uncontrolled exposure at prediction frequency	0.5493	mW/cm^2

2.1091

EIRP	26.79	(dBm)
ERP	24.64	(dBm)
ERP	0.29	(W)
ERP Limit	1.50	(W)
MARGIN	7.12	(dB)

3-5. CDMA BC1

Average output Power at antenna input terminal	25.70	dBm
Average output Power at antenna input terminal	371.54	mW
Prediction distance	20.000	cm
Prediction frequency	1850-1910	MHz
Cable Loss	-3.300	dB
Antenna Gain(typical)	5.23	dBi
Antenna Gain(final : Cable Loss + Antenna Gain)	1.93	dBi
Antenna Gain(numeric)	1.560	-
Power density at prediction frequency(S)	0.1153	mW/cm^2
MPE limit for uncontrolled exposure at prediction frequency	1.0000	mW/cm^2

2.1091

EIRP	27.63	(dBm)
ERP	25.48	(dBm)
ERP	0.353	(W)
ERP Limit	3.00	(W)
MARGIN	9.29	(dB)

3-6. LTE B4

Average output Power at antenna input terminal	25.70	dBm
Average output Power at antenna input terminal	371.54	mW
Prediction distance	20.000	cm
Prediction frequency	1710-1755	MHz
Cable Loss	-3.300	dB
Antenna Gain(typical)	3.96	dBi
Antenna Gain(final : Cable Loss + Antenna Gain)	0.66	dBi
Antenna Gain(numeric)	1.164	-
Power density at prediction frequency(S)	0.0860	mW/cm^2
MPE limit for uncontrolled exposure at prediction frequency	1.0000	mW/cm^2

2.1091

EIRP	26.36	(dBm)
ERP	24.21	(dBm)
ERP	0.264	(W)
ERP Limit	3.00	(W)
MARGIN	10.56	(dB)

3-7. LTE B13

Average output Power at antenna input terminal	25.70	dBm
Average output Power at antenna input terminal	371.54	mW
Prediction distance	20.000	cm
Prediction frequency	777-787	MHz
Cable Loss	-1.71	dB
Antenna Gain(typical)	1.38	dBi
Antenna Gain(final : Cable Loss + Antenna Gain)	-0.33	dBi
Antenna Gain(numeric)	0.927	-
Power density at prediction frequency(S)	0.0685	mW/cm^2
MPE limit for uncontrolled exposure at prediction frequency	0.5180	mW/cm^2

2.1091

EIRP	25.37	(dBm)
ERP	23.22	(dBm)
ERP	0.21	(W)
ERP Limit	1.50	(W)
MARGIN	8.54	(dB)

3-8. LTE B5

Average output Power at antenna input terminal	25.70	dBm
Average output Power at antenna input terminal	371.54	mW
Prediction distance	20.000	cm
Prediction frequency	824-849	MHz
Cable Loss	-1.71	dB
Antenna Gain(typical)	2.80	dBi
Antenna Gain(final : Cable Loss + Antenna Gain)	1.09	dBi
Antenna Gain(numeric)	1.285	-
Power density at prediction frequency(S)	0.0950	mW/cm^2
MPE limit for uncontrolled exposure at prediction frequency	0.5493	mW/cm^2

2.1091

EIRP	26.79	(dBm)
ERP	24.64	(dBm)
ERP	0.29	(W)
ERP Limit	1.50	(W)
MARGIN	7.12	(dB)

3-9. LTE B2

Average output Power at antenna input terminal	25.70	dBm
Average output Power at antenna input terminal	371.54	mW
Prediction distance	20.000	cm
Prediction frequency	1850-1910	MHz
Cable Loss	-3.300	dB
Antenna Gain(typical)	5.23	dBi
Antenna Gain(final : Cable Loss + Antenna Gain)	1.93	dBi
Antenna Gain(numeric)	1.560	-
Power density at prediction frequency(S)	0.1153	mW/cm^2
MPE limit for uncontrolled exposure at prediction frequency	1.0000	mW/cm^2

2.1091

EIRP	27.63	(dBm)
ERP	25.48	(dBm)
ERP	0.353	(W)
ERP Limit	3.00	(W)
MARGIN	9.29	(dB)

Worst Case: Simultaneous MPE 20cm is

5G WLAN (0.0032) + CDMA BC0 (0.095/0.5493) = 0.1761 < 1

5G WLAN (0.0032) + LTE B5 (0.095/0.5493) = 0.1761 < 1