

Test Report

Verified code: 419712

Report No.: E20230328398101-11

Customer: Neusoft Group (Dalian) Co., Ltd.

Address: No.901-7 Huangpu Road, Ganjingzi District,Dalian City, Liaoning Province, China

Sample Name: MEDIA HEADUNIT

Sample Model: INM2004MD

Receive Sample Date: Apr.06,2023

Test Date: Apr.12,2023 ~ Apr.14,2023

Reference Document: CFR 47, FCC Part 2.1091 Radio frequency radiation exposure evaluation: mobile devices.

Test Result: Pass

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GRG METROLOGY & TEST GROUP CO., LTD.

Issued Date: 2023-06-14

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REPORT ISSUED HISTORY

Report Version	Report No.	Description	Compile Date
1.0	E20230328398101-11	Original Issue	2023-06-02

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1. GENERAL DESCRIPTION OF EUT

1.1 APPLICANT

Name: Neusoft Group (Dalian) Co., Ltd.
Address: No.901-7 Huangpu Road, Ganjingzi District,Dalian City, Liaoning Province, China

1.2 MANUFACTURER

Name: Neusoft Group (Dalian) Co., Ltd.
Address: No.901-7 Huangpu Road, Ganjingzi District,Dalian City, Liaoning Province, China

1.3 FACTORY

Name: Qingdao Daesung Electronic Co., Ltd.
Address: No. 37, Mengshahe 1 Road, Jimo Zone Qingdao, Shandong, 266200 China

1.4 BASIC DESCRIPTION OF EQUIPMENT UNDER TEST

Product Name: MEDIA HEADUNIT
Model No.: INM2004MD
Adding Model: /
Trade Name: INEOS
FCC ID: 2AZAX-INM2004MD
Power Supply: DC 13.5V,10A
Frequency Range: Bluetooth :
GFSK $\pi/4$ -DQPSK/8DPSK: 2402MHz~2480MHz
2.4G wifi:
IEEE 802.11b/g/n HT20: 2412MHz-2462MHz
IEEE 802.11n HT40: 2422MHz-2452MHz
Station:
5G wifi-U-NII-1:
IEEE 802.11a / n HT20 / ac VHT20/ n HT40 / ac VHT40/ ac VHT80:
5180 MHz~5240 MHz
5G wifi-U-NII-3:
IEEE 802.11a / n HT20 / ac VHT20/ n HT40 / ac VHT40/ ac VHT80:
5745 MHz~5825 MHz
Hotspot:
5210MHz & 5775MHz for 5G WIFI 802.11ac VHT80;
Transmit Power: Reference Section 4 Table 2
Antenna Specification: Reference Section 4 Table 1
Temperature Range: -40°C~+85°C
Hardware Version: EE-0000002***
Software Version: SW-0000000***
Sample No: E20230328398101-0001

Note: The EUT antenna gain is provided by the applicant. This report is made solely on the basis of such data and/or information. We accept no responsibility for the authenticity and completeness of the above data and information and the validity of the results and/or conclusions.

2. LABORATORY AND ACCREDITATIONS

2.1. LABORATORY

The tests & measurements refer to this report were performed by Shenzhen EMC Laboratory of GRG METROLOGY & TEST GROUP CO., LTD.

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2.2. ACCREDITATIONS

Our laboratories are accredited and approved by the following approval agencies according to ISO/IEC 17025.

USA A2LA(Certificate #2861.01)

The measuring facility of laboratories has been authorized or registered by the following approval agencies.

Canada ISED (Company Number: 24897, CAB identifier:CN0069)

USA FCC (Registration Number: 759402, Designation Number:CN1198)

Copies of granted accreditation certificates are available for downloading from our web site,

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3. LIMITS FOR GENERAL POPULATION/UNCONTROLLED EXPOSURE

According to the KDB 447498 D04 Interim General RF Exposure Guidance v01, General frequency and separation-distance dependent MPE-based effective radiated power (ERP) thresholds are in Table 4.1 to support an exemption from further evaluation from 300 kHz through 100 GHz.

TABLE 4.1—THRESHOLDS FOR SINGLE RF SOURCES SUBJECT TO ROUTINE ENVIRONMENTAL EVALUATION

RF Source Frequency			Minimum Distance			Threshold ERP
f_L MHz		f_H MHz	$\lambda_L / 2\pi$		$\lambda_H / 2\pi$	W
0.3	–	1.34	159 m	–	35.6 m	1,920 R ²
1.34	–	30	35.6 m	–	1.6 m	3,450 R ² /f ²
30	–	300	1.6 m	–	159 mm	3.83 R ²
300	–	1,500	159 mm	–	31.8 mm	0.0128 R ² f
1,500	–	100,000	31.8 mm	–	0.5 mm	19.2R ²
Subscripts L and H are low and high; λ is wavelength. From § 1.1307(b)(3)(i)(C), modified by adding Minimum Distance columns.						

For mobile devices that are not exempt per Table 4.1 at distances from 20 cm to 40 cm and in 0.3 GHz to 6 GHz, evaluation of compliance with the exposure limits in §1.1310 is necessary if the ERP of the device is greater than $ERP_{20\text{cm}}$ in Formula (4.1).

$$P_{\text{th}} (\text{mW}) = ERP_{20\text{ cm}} (\text{mW}) = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases} \quad (4.1)$$

In accordance with KDB447498D04 Either SAR-based or MPE-based exemption may be considered for test exemption for fixed, mobile, or portable device exposure conditions; therefore, the contributions from each exemption in conjunction with the measured SAR (Evaluated_k term) shall be used to determine exemption for simultaneous transmission according to Formula

$$\text{MPE Ratio} = \sum_{j=1}^b \frac{ERP_j}{ERP_{\text{th},j}} < 1$$

ERP_j: the available maximum time-averaged power or the ERP, whichever is greater, of fixed, mobile, or portable RF source j.

ERP_{th,j}: exemption threshold ERP for fixed, mobile, or portable RF source j, at a distance of at least $\lambda/2\pi$, according to the applicable § 1.1307(b)(3)(i)(C) Table 1 formula at the location in question.

the sum of the ratios of the applicable terms for SAR-based, MPE-based and measured SAR or MPE shall be less than 1, to determine simultaneous transmission exposure compliance.

4. CALCULATION METHOD

Predication of MPE limit at a given distance

$EIRP(dBm) = \text{Maximum Tune-up Output power (dBm)} + \text{Maximum antenna gain (dBi)}$

$ERP(dBm) = EIRP(dBm) - 2.15$

R = minimum distance to the center of radiation of the antenna

From the EUT RF output power, the minimum mobile separation distance, d=20cm, as well as the maximum gain of the used as following information, the RF power ERP can be obtained.

Table 1 Antenna Specification

Frequency Band	Antenna type	Internal Identification	Maximum antenna gain
BT	PCB antenna	Antenna 1	1.83 dBi
2.4G wifi	PCB antenna	Antenna 1	1.83 dBi
		Antenna 2	2.59 dBi
5G wifi U-NII-1	PCB antenna	Antenna 1	4.26 dBi
		Antenna 2	5.19 dBi
5G wifi U-NII-3		Antenna 1	4.96 dBi
		Antenna 2	4.03 dBi

Table 2 Transmit Power

Frequency Band	Test mode	Internal Identification	Maximum Output Power (dBm)	Tune-up Output Power Range (dBm)
BT	DH5	Antenna 1	2.04	2.5 ± 1.0
	2DH5	Antenna 1	5.62	6.0 ± 1.0
	3DH5	Antenna 1	5.57	6.0 ± 1.0
2.4G wifi	802.11b	Antenna 1	13.92	14.0 ± 1.0
		Antenna 2	15.14	15.5 ± 1.0
	802.11g	Antenna 1	17.34	17.5 ± 1.0
		Antenna 2	17.70	18.0 ± 1.0
	802.11n HT20	Antenna 1	18.14	18.5 ± 1.0
		Antenna 2	18.53	19.0 ± 1.0
	802.11n HT40	Antenna 1	18.25	18.5 ± 1.0
		Antenna 2	18.37	18.5 ± 1.0
5G wifi U-NII-1 (Station)	802.11a	Antenna 1	5.07	5.5 ± 1.0
		Antenna 2	5.34	5.5 ± 1.0
	802.11n HT20 MIMO	Antenna 1+ Antenna 2	8.41	8.5 ± 1.0
	802.11n HT40 MIMO	Antenna 1+ Antenna 2	9.03	9.5 ± 1.0
	802.11ac VHT20 MIMO	Antenna 1+ Antenna 2	8.09	8.5 ± 1.0
	802.11ac VHT40 MIMO	Antenna 1+ Antenna 2	8.91	9.0 ± 1.0
	802.11ac VHT80 MIMO	Antenna 1+ Antenna 2	8.80	9.0 ± 1.0

5G wifi U-NII-3 (Station)	802.11a	Antenna 1	5.30	5.5 ± 1.0
		Antenna 2	6.05	6.5 ± 1.0
	802.11n HT20 MIMO	Antenna 1+ Antenna 2	8.80	9.0 ± 1.0
	802.11n HT40 MIMO	Antenna 1+ Antenna 2	9.35	9.5 ± 1.0
	802.11ac VHT20 MIMO	Antenna 1+ Antenna 2	8.50	9.0 ± 1.0
	802.11ac VHT40 MIMO	Antenna 1+ Antenna 2	9.40	9.5 ± 1.0
	802.11ac VHT80 MIMO	Antenna 1+ Antenna 2	9.20	9.5 ± 1.0
5G wifi U-NII-1 (Hotspot)	802.11ac VHT80 MIMO	Antenna 1+ Antenna 2	8.80	9.0 ± 1.0
5G wifi U-NII-3 (Hotspot)	802.11ac VHT80 MIMO	Antenna 1+ Antenna 2	9.20	9.5 ± 1.0

Note:

1. The maximum output Power of BT were refer to the module report. (Report No.: E20230328398101-8).
2. The maximum output Power of 2.4G wifi were refer to the module report. (Report No.: E20230328398101-9)
3. The maximum output Power of 5G wifi were refer to the module report. (Report No.: E20230328398101-10)

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5. ESTIMATION RESULT

5.1 MEASUREMENT RESULTS

STANDALONE MPE

Mode	Frequency (MHz)	Maximum Tune-up Output power (dBm)	Maximum Antenna Gain (dBi)	Maximum Tune-up EIRP (dBm)	Maximum Tune-up ERP (dBm)	Maximum Tune-up ERP (mW)	Threshold ERP (mW)
BT	2402-2480	7.0	1.83	8.83	6.68	4.656	768
2.4G WIFI-ANT1	2412-2472	19.5	1.83	21.33	19.18	82.794	768
2.4G WIFI-ANT2	2412-2472	20.0	2.59	22.59	20.44	110.662	768
5G wifi U-NII-1 (Station)	5150-5250	10.5	5.19	15.69	13.54	22.594	768
5G wifi U-NII-3 (Station)	5725-5850	10.5	4.96	15.46	13.31	21.429	768
5G wifi U-NII-1 (Hotspot)	5150-5250	10.0	5.19	15.19	13.04	20.137	768
5G wifi U-NII-3 (Hotspot)	5725-5850	10.5	4.96	15.46	13.31	21.429	768

Remark:

1. RF Exposure use distance is 20cm from manufacturer declaration of user manual.
- 2 $ERP = EIRP - 2.15$
3. Threshold $ERP(W) = 19.2R^2(W) = 19.2 * 0.2 * 0.2(W) = 0.7680(W) = 768(mW)$.

For Simultaneous transmission:

- $$\begin{aligned} \sum \text{MPE ratios} &= \text{MPE ratio(BT)} + \text{MPE ratio(2.4G wifi-ANT2)}; \\ \sum \text{MPE ratios} &= \text{MPE ratio(BT)} + \text{MPE ratio(5G wifi-U-NII-1(Station))}; \\ \sum \text{MPE ratios} &= \text{MPE ratio(BT)} + \text{MPE ratio(5G wifi-U-NII-3(Station))}; \\ \sum \text{MPE ratios} &= \text{MPE ratio(BT)} + \text{MPE ratio(5G wifi-U-NII-1(Hotspot))}; \\ \sum \text{MPE ratios} &= \text{MPE ratio(BT)} + \text{MPE ratio(5G wifi-U-NII-3(Hotspot))}; \end{aligned}$$

Maximum Simultaneous transmission MPE Ratio for WLAN(2.4G wifi) and BT

Maximum MPE ratio (2.4G wifi-ANT2)	Maximum MPE ratio (BT)	$\sum$ MPE ratios	Limit	Results
0.144	0.006	0.150	1.000	Pass

Note:

1. The bluetooth and wifi support simultaneous.
2. ERP_j : the available maximum time-averaged power or the ERP, whichever is greater, of fixed, mobile, or portable RF source j.
3. $ERP_{th,j}$: exemption threshold ERP for fixed, mobile, or portable RF source j, at a distance of at least $\lambda/2\pi$, according to the applicable § 1.1307(b)(3)(i)(C) Table 1 formula at the location in question.
4. Maximum MPE Ratio (2.4G wifi-ANT2) = Maximum Tune-up ERP / Threshold ERP
 $= 110.662mW / 768mW = 0.144$;
 Maximum MPE Ratio (BT) = Maximum Tune-up ERP(5G wifi U-NII-3) / Threshold ERP
 $= 4.656mW / 768mW = 0.006$;
5. $\sum \text{MPE ratios} = \text{Maximum MPE Ratio (2.4G wifi-ANT2)} + \text{Maximum MPE Ratio (BT)}$
 $= 0.144 + 0.006 = 0.150 < 1$.
6. The result is pass.

6. CONCLUSION

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

----- End of Report -----