Test Report

Verified code: 774230

Report No.: E20240611910801-6

Customer:	Hefei Invispower Co., Ltd
Address:	2A, Yousi Tiancheng Industrial Park, No. 1800, Dabieshan Road, High-tech Zone, Heifei China
Sample Name:	NKR3 ECU
Sample Model:	NKR3-O-SX-21470
Receive Sample Date:	Jun.18,2024
Test Date:	Jun.27,2024 ~ Jul.08,2024
Reference Document:	CFR 47, FCC Part 2.1091Radiofrequency radiation exposure evaluation: mobile devices.
Test Result:	Pass

Prepared by: Huang Lifang

Reviewed by: Wu Haoting

Approved by: Xiao Liang

GRG METROLOGY & TEST GROUP CO., LTD.

Issued Date: 2024-08-06

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5. This testing report is only for scientific research, teaching, internal quality control, etc.

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REPORT ISSUED HISTORY

Report Version	Report No.	Description	Compile Date
1.0	E20240611910801-6	Original Issue	2024-07-09

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1. GENERAL DESCRIPTION OF EUT

1.1 APPLICANT

Name:	Hefei Invispower Co., Ltd
Address:	2A, Yousi Tiancheng Industrial Park, No. 1800, Dabieshan Road, High-tech Zone, Heifei China

1.2 MANUFACTURER

Name:	Hefei Invispower Co., Ltd
Address:	2A, Yousi Tiancheng Industrial Park, No. 1800, Dabieshan Road, High-tech Zone, Heifei China

1.3 FACTORY

Name:	Jiangsu InvisPower Co., Ltd
Address:	No.100, Xinning Road,Chongchuan District, Nantong City, Jiangsu Province, P.R.China

1.4 BASIC DESCRIPTIONOF EQUIPMENTUNDER TEST

Equipment:	NKR3 ECU
Model No.:	NKR3-O-SX-21470
Adding Model:	/
Models Difference:	/
Trade Name:	INVISPOWER
FCC ID:	2BBHHYGKJ-CM1ENFC
Power supply:	DC 9-16V, 15A(Max)
Frequency Band:	13.65MHz for NFC
Maximum Transmit Power:	-29.33dBm
Modulation type:	ASK
Antenna Specification:	PCB antenna
Temperature Range:	-35℃ ~ +85℃
Hardware Version:	V1.2
Software Version:	V4.3
Sample No:	E20240611910801-0002
Note:	1.The basic description of the EUT is provided by the applicant. This report is made Solel yon 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

The tests & measurements refer to this report were performed by Shenzhen EMC Laboratory of Guangzhou GRG Metrology & Test Co., Ltd.

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3.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, http://www.grgtest.com

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4. LIMITS FOR GENERAL POPULATION/UNCONTROLLED EXPOSURE

General

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^2f
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_{20cm} in Formula (4.1).

$$P_{th}\,(\text{mW}) = ERP_{20\,cm}\,(\text{mW}) = \begin{cases} 2040f & 0.3\ \text{GHz} \le f < 1.5\ \text{GHz} \\ 3060 & 1.5\ \text{GHz} \le f \le 6\ \text{GHz} \end{cases} \quad (4,1)$$

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

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

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

5. CALCULATION METHOD

Predication of MPE limit at a given distance

EIRP(dBm)= Maximum Tune-up Output power (dBm)+ 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

Mode	Antenna type	Internal Identification
NFC	PCB antenna	Antenna 1

Table 2 Transmit Power

Mode	Maximum EIRP (dBm)	Tune-up EIRP (dBm)
NFC	-29.33	-29.00±1

Remark:

1) NFC Maximum EIRP(dBm) =NFC maximum output electric field intensity(dBuV/m)+20log(d)-104.7=65.83dBuV/m +20log(3m)–104.7= -29.33dBm

2) The NFC maximum output electric field intensity is refered in the RF report(E20240611910801-5).

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6. ESTIMATION RESULT

6.1. MEASUREMENT RESULTS

STANDALONE MPE

Mode	Frequency (MHz)	Maximum Tune-up EIRP (dBm)	Maximum Tune-up ERP (dBm)	Maximum Tune-up ERP (W)	Threshold ERP (W)
NFC	13. 56	-28.00	-30.15	9.66051E-07	0.751

Remark:

1) RF Exposure use distance is 20cm from manufacturer declaration of user manual.

2) 1.34 MHz<f≤30MHz Threshold ERP(W)= 3450R / f^2 (W)=3450*0.2*0.2/(13.56*13.56)(W)=0.751(W),

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

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7. CONCLUSION

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

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