

RF EXPOSURE REPORT

FOR

Applicant	:	Beijing InHand Networks Technology Co., Ltd.
Address	:	Room 501, floor 5, building 3, yard 18, ziyue road, chaoyang district, Beijing
Equipment under Test	:	InVehicle Gateway
Model No.	:	VG710-NRQ3
Trade Mark	:	
FCC ID	:	2AANYVG7
Manufacturer	:	Beijing InHand Networks Technology Co., Ltd.
Address	:	Room 501, floor 5, building 3, yard 18, ziyue road, chaoyang district, Beijing

Issued By: Dongguan Dongdian Testing Service Co., Ltd.

Add.: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park,
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REPORT

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Test Report Declare

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Trade mark	:	 inhand
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Address	:	Room 501, floor 5, building 3, yard 18, ziyue road, chaoyang district, Beijing

Standard Used: KDB447498 D01 General RF Exposure Guidance v06

We Declare:

The equipment described above is assessed by Dongguan Dongdian Testing Service Co., Ltd and in the configuration assessed the equipment complied with the standards specified above. The assessed results are contained in this report and Dongguan Dongdian Testing Service Co., Ltd is assumed of full responsibility for the accuracy and completeness of these assess.

After evaluation, our opinion is that the equipment In Accordance with above standard.

Report No:	DDT-R22020803-2E03		
Date of Receipt:	Feb. 14, 2022	Date of Test:	Feb. 14, 2022 ~ Mar. 28, 2022

Prepared By:

Sam Li

Sam Li/Engineer

Approved By:



Damon Hu/EMC Manager

Note: This report applies to above tested sample only. This report shall not be reproduced in parts without written approval of Dongguan Dongdian Testing Service Co., Ltd.

Revision History

Rev.	Revisions	Issue Date	Revised By
---	Initial issue	Mar. 28, 2022	

1. General Information

1.1. Description of equipment

EUT* Name	: InVehicle Gateway
Model Number	: VG710-NRQ3
EUT function description	: Please reference user manual of this device
Power Supply	: Input: DC 9-36V
Sample Type	: Series production
Serial Number	: N/A

2.4G WIFI:

Radio Technology	: IEEE 802.11b/g/n
Operation frequency	: IEEE 802.11b: 2412 MHz - 2462 MHz IEEE 802.11g: 2412 MHz - 2462 MHz IEEE 802.11n HT20: 2412 MHz - 2462 MHz IEEE 802.11n HT40: 2422 MHz - 2452 MHz
Modulation	: IEEE 802.11b: DSSS (CCK, DQPSK, DBPSK) IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Transmitter rate	: IEEE 802.11b: 1, 2, 5.5, 11 Mbps IEEE 802.11g: 6, 9, 12, 18, 24, 36, 48, 54 Mbps IEEE 802.11n HT20: up to 144.4 Mbps IEEE 802.11n HT40: up to 300 Mbps
Antenna Gain	: Antenna 1: 3 dBi Antenna 2: 3 dBi

Antenna information			
	Ant1 gain	Ant2 gain	MIMO
IEEE 802.11b	3	3	/
IEEE 802.11g	3	3	/
IEEE 802.11n HT20	3	3	6.01
IEEE 802.11n HT40	3	3	6.01

5G WIFI:

Radio Technology	: IEEE 802.11a/n/ac
Operation frequency	: IEEE 802.11a: 5180 MHz - 5240 MHz, 5745 MHz - 5825 MHz IEEE 802.11n HT20: 5180 MHz - 5240 MHz, 5745 MHz - 5825 MHz IEEE 802.11n HT40: 5190 MHz - 5230 MHz, 5755 MHz - 5795 MHz IEEE 802.11ac HT20: 5180 MHz - 5240 MHz, 5745 MHz - 5825 MHz IEEE 802.11ac HT40: 5190 MHz - 5230 MHz, 5755 MHz - 5795 MHz IEEE 802.11ac HT80: 5210 MHz, 5775 MHz
Modulation	: IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE 802.11ac: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)
Transmitter rate	: IEEE 802.11a: 6, 9, 12, 18, 24, 36, 48, 54 Mbps IEEE 802.11n HT20: 14.4, 28.9, 43.3, 57.8, 86.7, 115.6, 130.0, 144.4 Mbps IEEE 802.11n HT40: 30, 60, 90, 120, 180, 240, 270, 300 Mbps IEEE 802.11ac HT20: 14.4, 28.8, 43.4, 57.8, 86.6, 115.6, 130, 144.4, 173.4 Mbps IEEE 802.11ac HT40: 30, 60, 90, 120, 180, 240, 270, 300, 360, 400 Mbps IEEE 802.11ac HT80: 65, 130, 195, 260, 390, 520, 585, 650, 780, 866.6 Mbps
Antenna Gain	: Antenna 1: 3 dBi Antenna 2: 3 dBi

Note: For ISCED, the 5150-5250 MHz band has been disabled by software.

Antenna information			
	Ant1 gain	Ant2 gain	MIMO
IEEE 802.11a	3	3	/
IEEE 802.11n HT20	3	3	6.01
IEEE 802.11n HT40	3	3	6.01
IEEE 802.11ac VHT20	3	3	6.01
IEEE 802.11ac VHT40	3	3	6.01
IEEE 802.11ac VHT80	3	3	6.01

1.2. Assess laboratory

Dongguan Dongdian Testing Service Co., Ltd.

Add.: No. 17, Zongbu Road 2, Songshan Lake Sci&Tech, Industry Park, Dongguan City, Guangdong Province, China, 523808.

Tel.: +86-0769-38826678, <http://www.dgddt.com>, Email: ddt@dgddt.com.

CNAS Accreditation No. L6451; A2LA Accreditation Number: 3870.01

FCC Designation Number: CN1182, Test Firm Registration Number: 540522

Innovation, Science and Economic Development Canada Site Registration Number: 10288A

Conformity Assessment Body identifier: CN0048

VCCI facility registration number: C-20087, T-20088, R-20123, G-20118

2. RF Exposure Evaluation

2.1. Requirement

Systems operating under the provisions of FCC 47 CFR section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2 m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.

Limits for General Population/Uncontrolled Exposure

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz ; *Plane-wave equivalent power density

2.2. Calculation method

$$E(\text{V/m}) = \frac{\sqrt{30 \times P \times G}}{d} \quad \text{Power Density: } S(\text{mW/cm}^2) = \frac{E^2}{377}$$

E = Electric field (V/m)

P = Peak RF output power (mW)

G = EUT Antenna numeric gain (numeric)=

d = Separation distance between radiator and human body (m)

The formula can be changed to

We can change the formula to:

$$S = \frac{30 \times P \times G}{377 \times d^2} \quad \text{or, } d = \sqrt{\frac{30 \times P \times G}{377 \times S}}$$

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2 m, as well as the gain of the used antenna, the RF power density can be obtained.

2.3. Estimation result

Single transmission:

Mode	PK Output power (dBm)	Output power (mW)	Antenna Gain (dBi)	Antenna Gain (linear)	MPE Values (mW/cm ²)	MPE Limit (mW/cm ²)
2.4G wifi	13.71	23.50	3	2	0.00935	1
5G wifi	17.83	60.67	3	2	0.02414	1

Simultaneous transmission:

2.4G wifi Mode	PK Output power (dBm)	Output power (mW)	Antenna Gain (dBi)	Antenna Gain (linear)	MPE Values (mW/cm ²)	MPE Limit (mW/cm ²)
Ant 1	12.87	19.36	3	2	0.00770	1
Ant 2	13.70	23.44	3	2	0.00933	1
Maximum MPE ratio 2.4G wifi = 0.00770+0.00933 = 0.01703						

5G wifi Mode	PK Output power (dBm)	Output power (mW)	Antenna Gain (dBi)	Antenna Gain (linear)	MPE Values (mW/cm ²)	MPE Limit (mW/cm ²)
Ant 1	11.09	12.85	3	2	0.00511	1
Ant 2	13.62	23.01	3	2	0.00916	1
Maximum MPE ratio 5G wifi = 0.00511+0.00916 = 0.01427						

The RF Exposure of WCDMA, LTE and 5G NR SA please refer to the report: 2010RSU005-U8.

MIMO:

WIFI+ WCDMA: $0.01703/1+0.01427/1+0.3969/0.4476=0.918<1$

WIFI+ LTE: $0.01703/1+0.01427/1+0.1989/0.2220=0.927<1$

WIFI+ 5G NR SA: $0.01703/1+0.01427/1+0.1989/0.2220=0.927<1$

Note: The estimation distance is 20 cm

Conclusion: MPE evaluation required since transmitter power is below FCC threshold

END OF REPORT