RF EXPOSURE REPORT

Report No.:	20230817G10068X-W5
Product Name:	GNSS RTK Receiver
Model No.:	V500
FCC ID:	O39V500
Applicant:	Hi-Target Surveying Instrument Co., Ltd.
Address:	202, BLDG 13, Tian'An HQ Center, No.555 North Panyu RD. Donghuan Block, Panyu District, 511400 Guangzhou, China.
Dates of Testing:	08/16/2023 - 10/19/2023
Issued by:	CCIC Southern Testing Co., Ltd.
Lab Location:	Electronic Testing Building, No. 43 Shahe Road, Xili Street, Nanshan District, Shenzhen, Guangdong, China.
	Tel: 86 755 26627338 **Fax:** 86 755 26627238

Test Report

Product .....:	GNSS RTK Receiver
Brand Name.....:	Hi-Target
Trade Name .....:	Hi-Target
Applicant.....:	Hi-Target Surveying Instrument Co., Ltd.
Applicant Address .....:	202, BLDG 13, Tian'An HQ Center, No.555 North Panyu RD. Donghuan Block, Panyu District, 511400 Guangzhou, China.
Manufacturer .....:	Hi-Target Surveying Instrument Co., Ltd.
Manufacturer Address .....:	202, BLDG 13, Tian'An HQ Center, No.555 North Panyu RD. Donghuan Block, Panyu District, 511400 Guangzhou, China.
Test Standards .....:	47 CFR Part 2.1091
Test Result.....:	Pass

Tested by .....: 2023.11.20

Chuiwang Zhang, Test Engineer

Reviewed by .....: 2023.11.20

Chris You, Senior Engineer

Approved by.....: 2023.11.20

Yang Fan, Manager

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Change History		
Issue	Date	Reason for change
1.0	2023.11.20	First edition

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	GNSS RTK Receiver
Model No.	V500
Device Type	Mobile Device
EUT supports Radios application	BT/WIFI/UHF
Frequency Range	BT: 2402MHz~2480MHz WIFI: 2412MHz~2462MHz UHF: 410.025MHz~469.975MHz
Modulation Type	BT: GFSK, π/4-DQPSK, 8DPSK WIFI: DSSS (802.11b), OFDM (802.11g/n) UHF: GMSK, 4FSK
Antenna gain	BT/WIFI: -0.5dBi UHF: 2.0dBi
Antenna Type	BT/WIFI: Internal Antenna UHF: External Antenna

Note 1: The information of antenna gain and cable loss is provided by the manufacturer and our lab is not responsible for the accuracy of the antenna gain and cable loss information.

1.2. EUT Description

EUT has been tested according to the following standards.

No.	Identity	Document Title
1	47 CFR Part 1	Practice and Procedure
2	47 CFR Part 2	Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
3	KDB 447498 D01 General RF Exposure Guidance v06	RF Exposure Procedures and Equipment Authorization Policies for Mobile and Portable Devices
4	OET Bulletin 65 Edition 97-01	Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields

1.3. Laboratory Facilities

FCC-Registration No.: 406086

CCIC Southern Testing Co., Ltd EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The acceptance letter from the FCC is maintained in our files. Designation Number: CN1283, valid time is until Oct. 30th, 2023.

ISED Registration: 11185A

CCIC Southern Testing Co., Ltd. EMC Laboratory has been registered by Certification and Engineering Bureau of Industry Canada for the performance of radiated measurements with Registration No. 11185A on Aug. 04, 2016, valid time is until Oct. 30th, 2023.

CAB number: CN0064

A2LA Code: 5721.01

CCIC-SET is a third party testing organization accredited by A2LA according to ISO/IEC 17025. The accreditation certificate number is 5721.01.

1.4. Laboratory Location

Company Name:	CCIC Southern Testing Co., Ltd.
Address:	Electronic Testing Building, No. 43 Shahe Road, Xili Street, Nanshan District, Shenzhen, Guangdong, China

2. Technical Requirements Specification in CFR Title 47 Part 2.1091

2.1. Evaluation method

The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b).

Table 1 to §1.1310(e)(1) - Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm^2)	Averaging Time (minutes)
(i) Limits for Occupational/Controlled Exposure				
0.3-3.0	614	1.63	*(100)	< 6
3.0-30	1824/f	4.89/f	*($900/f^2$)	< 6
30-300	61.4	0.163	1.0	< 6
300-1500	/	/	f/300	< 6
1500-100,000	/	/	5	< 6
(ii) Limits for General Population/Uncontrolled Exposure				
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
Note: f = frequency in MHz. * = Plane-wave equivalent power density.				

2.2. Predication of MPE limit at a given distance

Refer to formulas on page 19 of OET Bulletin 65, Edition 97-01.

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = power density (in appropriate units, e.g. mW/cm^2)

P = power input to the antenna (in appropriate units, e.g., mW)

G = numeric gain of the antenna in the direction of interest relative to an isotropic radiator

R = distance to the centre of radiation of the antenna (appropriate units, e.g., cm)

2.3. Evaluation Results

Worst-Case mode Conducted Output Power Results

Bluetooth(GMSK)			
Frequency (MHz)	2402	2440	2480
Test Results (dBm)	3.53	3.88	4.24
Target (dBm)	4.0	4.0	5.0
Tolerance (dB)	±1	±1	±1

2.4G WIFI (IEEE 802.11b)			
Frequency (MHz)	2412	2437	2462
Test Results (dBm)	12.91	13.47	13.57
Target (dBm)	13.0	14.0	14.0
Tolerance (dB)	±1	±1	±1

UHF(GMSK)			
Frequency (MHz)	410.025	440.000	469.975
Test Results (dBm)	32.904	32.983	33.102
Target (dBm)	33.0	33.0	33.0
Max. Tolerance	33.8	33.8	33.8
UHF(4FSK)			
Frequency (MHz)	410.025	440.000	469.975
Test Results (dBm)	32.865	32.939	33.141
Target (dBm)	33.0	33.0	33.0
Max. Tolerance	33.8	33.8	33.8

Calculation results: Worst-Case mode

Operation Mode	Output Power (dBm)	Ant. Gain		Distance (cm)	MPE (mW/cm^2)	MPE Limit (mW/cm^2)	Ratio
		(dBi)	(numeric)				
Bluetooth	6.0	-0.5	0.94	50	0.0001	1.000	0.0001
2.4G WIFI	15.0	-0.5	0.94	50	0.0011	1.000	0.0011
UHF	33.8	2.0	1.26	50	0.121	0.313	0.387

Note: Output power including turn-up tolerance

Simultaneous Transmission Calculation (Worst-case mode)

No.	Transmitter Combinations	Scenario Supported or not
1	Bluetooth + 2.4G WLAN + UHF	Yes

Max Simultaneous Transmission Calculation (Worst-case mode)

No.	Worst Mode	MPE Ratio	Limit	Results
1	Bluetooth + 2.4G WLAN + UHF	0.388	≤ 1.0	Pass

Note: MPE Ratio = 0.0001 + 0.0011 + 0.387 = 0.6422.

2.4. Conclusion

According to the KDB 447498 D01 General RF Exposure Guidance v06 section 7.2 determine the device is exclusion from SAR test.

** END OF REPORT **