SGS-CSTC Standards Technical Services Co., Ltd.

No. 1 Workshop, M-10, Middle section, Science & Technology Park, Nanshan District, Shenzhen, Guangdong, China 518057
Telephone: +86 (0) 755 2601 2053
Fax: +86 (0) 755 2671 0594
Email: ee.shenzhen@sgs.com

RF Exposure Evaluation Report

Application No.:	SZEM1406003358RF
Applicant:	Hi-Target Surveying Instrument Co., Ltd
Manufacturer/ Factory:	Hi-Target Surveying Instrument Co., Ltd
Product Name:	GNSS RTK
Model No.(EUT):	A8
Trade Mark:	HI-TARGET
FCC ID:	O39ZHDA8
Standards:	47 CFR Part 1.1307(2013) 47 CFR Part 1.1310(2013)
Date of Receipt:	2014-10-10
Date of Test:	2014-10-16 to 2014-12-11
Date of Issue:	2015-02-12
Test Result :	**PASS***

* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:

Jack Zhang
EMC Laboratory Manager

The manufacturer should ensure that all products in series production are in conformity with the product sample detailed in this report.
If the product in this report is used in any configuration other than that detailed in the report, the manufacturer must ensure the new system complies with all relevant standards. Any mention of SGS International Electrical Approvals or testing done by SGS International Electrical Approvals in connection with, distribution or use of the product described in this report must be approved by SGS International Electrical Approvals in writing.
The report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the federal government. All test results in this report can be traceable to National or International Standards.

2 Version

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
00		2014-12-18		Original

Authorized for issue by:				
Tested By		Chris Zhong		2014-12-11
		(Chris Zhong) /Project Engineer		**Date**
Prepared By		Link Liang		2014-12-18
		(Link Liang) /Clerk		**Date**
Checked By		Emen_Li		2014-12-24
		(Emen Li) /Reviewer		**Date**

3 Contents

4 General Information

4.1 Client Information

Applicant:	Hi-Target Surveying Instrument Co., Ltd
Address of Applicant:	Plant 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
Address of Manufacturer:	Plant 202, BLDG 13, Tian'An HQ Center, No.555 North Panyu RD. Donghuan Block, Panyu District, 511400 Guangzhou, China.
Factory:	Hi-Target Surveying Instrument Co., Ltd
Address of Factory:	Plant 202, BLDG 13, Tian'An HQ Center, No.555 North Panyu RD. Donghuan Block, Panyu District, 511400 Guangzhou, China.

4.2 General Description of EUT

Product Name:	GNSS RTK	
Model No.:	A8	
Trade Mark:	HI TARGET	
Operation Frequency:	2402MHz~2480MHz	
Bluetooth Version:	2.0+EDR	
Modulation Technique:	Frequency Hopping Spread Spectrum(FHSS)	
Modulation Type:	GFSK, π/4DQPSK, 8DPSK	
Number of Channel:	79	
Hopping Channel Type:	Adaptive Frequency Hopping systems	
Sample Type:	fixed production	
Test Power Grade:	0(manufacturer declare)	
Test Software of EUT:	adb (manufacturer declare)	
Antenna Type and Gain:	Type :Integral Gain :2dBi	
Power Supply:	Adapter:	Model: GM26-120200-D Input: AC 100~240 V 50/60Hz 1.0A Output: 12V ⎓ 2.0A
	Battery:	Model:BL-5000 7.4V ⎓ 5000mAh 37Wh Max Charging Voltage:8.4V
Test Voltage:	AC 230V 50Hz	
USB cable:	156cm (Shieldeded)	
Eight-core socket and protection plug:	138 cm(Shieldeded)	
DC Cable:	150cm(Shieldeded)	
Five-core socket and protection plug:	202 cm(Shieldeded)	
Single modular For 2G :	FCC ID:N7NSL6087	
Note: The AC/DC adapter is only for the battery charger		

4.3 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch E&E Lab

No. 1 Workshop, M-10, Middle section, Science & Technology Park, Shenzhen, Guangdong, China 518057

Telephone: +86 (0) 755 2601 2053 Fax: +86 (0) 755 2671 0594

No tests were sub-contracted.

4.4 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

- **CNAS (No. CNAS L2929)**

  CNAS has accredited SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch EMC Lab to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

- **VCCI**

  The 10m Semi-anechoic chamber and Shielded Room (7.5m x 4.0m x 3.0m) of SGS-CSTC Standards Technical Services Co., Ltd. have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-823, R-4188, T-1153 and C-2383 respectively.

- **FCC – Registration No.: 556682**

  SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen 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. Registration No.: 556682.

- **Industry Canada (IC)**

  Two 3m Semi-anechoic chambers of SGS-CSTC Standards Technical Services Co., Ltd. have been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 4620C-1 & 4620C-2.

4.5 Deviation from Standards

None.

4.6 Abnormalities from Standard Conditions

None.

4.7 Other Information Requested by the Customer

None.

5 RF Exposure Evaluation

5.1 RF Exposure Compliance Requirement

5.1.1 Limits

According to FCC Part1.1310: 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 part1.1307(b)

TABLE 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)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/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
(B) 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

F= Frequency in MHz

Friis Formula

Friis transmission formula: Pd = (Pout*G)/(4* Pi * R 2)

Where

Pd = power density in mW/cm2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

R = distance between observation point and center of the radiator in cm

Pd id the limit of MPE, 1 mW/cm2 . If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

5.1.2 Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

4.1.3 EUT RF Exposure Evaluation

Antenna Gain: 2dBi
Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2 in linear scale.
Output Power Into Antenna & RF Exposure Evaluation Distance:

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20cm (mW/cm^2)	Limit	Result
Middle	2441	2.00	1.58	0.0005	1.0	PASS

For GSM850:

Channel	Frequency (MHz)	Max Conducted Peak Output Power (dBm)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm^2)	Limit	Result
Lowest	824.2	32.40	1732.80	0.137	0.55	PASS

Note: Power Density = EIRP*DutyCycle/(4πR2)
where DutyCycle is 0.25 for GPRS Class 10 operation and R is 20 cm.

For GSM1900:
The peak conducted output power in PCS band is 29.4 dBm. Take the worst case as an example, in which an antenna with 2 dBi gain is used. The resulted ERP can be expressed
as follows:

ERP = 29.4 + 2 –2.15 = 29.25 dBm (0.841 W) < 3 W

The FCC OET Bulletin 65 Supplement C states that mobile devices identified in 47 CFR §2.1091 that operate at frequencies above 1.5 GHz with an ERP of 3.0 watts or more are required to perform routine environmental evaluation for RF exposure prior to equipment authorization or use; otherwise, they are categorically excluded.

Note: Refer to report No. SZEM140600335801 for EUT test Max Conducted Peak Output Power value;
for GSM please refer to **FCC ID : N7NSL6087** for EUT test Max Conducted Output Power value
The distance r (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.