

Radio Test Report

Report No.: STS2307028H01

Issued for

Guangzhou Devecent Information Technology Co., Ltd.

Rm 402, Building A, No.11, CaiPin Road, Science City,
HuangPu District, GuangZhou, GuangDong, China

Product Name: High Precision GNSS Receiver

Brand Name: ZX

Model Name: M68G

Series Model(s): N/A

FCC ID: 2BB82-M68G

Test Standards: FCC 47CFR §2.1091

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**TEST REPORT**

Applicant's Name : Guangzhou Devecent Information Technology Co., Ltd.
Address : Rm 402, Building A, No.11, CaiPin Road, Science City, HuangPu District, GuangZhou, GuangDong, China
Manufacturer's Name : Guangzhou Devecent Information Technology Co., Ltd.
Address : Rm 402, Building A, No.11, CaiPin Road, Science City, HuangPu District, GuangZhou, GuangDong, China

Product Description

Product Name..... : High Precision GNSS Receiver
Brand Name : ZX
Model Name : M68G
Series Model(s) : N/A

Test Standards : FCC 47CFR §2.1091
447498 D04 Interim General RF Exposure Guidance v01

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Date of Test..... :

Date of receipt of test item : 06 July 2023
Date (s) of performance of tests..... : 06 July 2023 ~ 30 Aug. 2023
Date of Issue..... : 30 Aug. 2023
Test Result..... : **Pass**

Testing Engineer :

Aaron Bu

(Aaron Bu)

Technical Manager :

Sean She

(Sean she)

Authorized Signatory :

Chris Chen

(Chris Chen)





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Revision History

Rev.	Issue Date	Report No.	Effect Page	Contents
00	30 Aug. 2023	STS2307028H01	ALL	Initial Issue



1. GENERAL INFORMATION

1.1 GENERAL DESCRIPTION OF THE EUT

Product Name	High Precision GNSS Receiver	
Brand	ZX	
Model Number	M68G	
Series Model(s)	N/A	
Model Difference	N/A	
Product Description	The EUT is High Geodetic GNSS receiver	
	Operation Frequency:	GSM 850: 824 MHz ~ 849MHz GSM 1900: 1850 MHz ~ 1910MHz WCDMA 1900: 1850 MHz ~1910MHz WCDMA 1700: 1710 MHz ~ 1755 MHz WCDMA 850: 824 MHz ~ 849 MHz LTE Band 2:1850~1910MHz LTE Band 4:1710~1755MHz LTE Band 5:824~849MHz LTE Band 7:2500~2570MHz LTE Band 12:699~716MHz LTE Band 13:777~787MHz LTE Band 25:1850~1915 MHz LTE Band 26: 814~849 MHz LTE Band 38: 2570~2620 MHz LTE Band 41: 2496~2690 MHz UHF: 421-470MHz Bluetooth: 2402 MHz to 2480 MHz 2.4G WLAN: 802.11b/g/n(20MHz): 2412MHz to 2462 MHz 802.11n(40MHz): 2422MHz to 2452 MHz 5G WIFI: 802.11a/ n(HT20)/ac(VHT20): 5.180GHz-5.825GHz 802.11n(HT40)/ac(VHT40): 5.190GHz-5.795GHz 802.11ac(VHT80): 5.210GHz-5.775GHz
Product Description	Modulation Type:	GMSK and 8PSK for EDGE WCDMA: QPSK LTE: QPSK /16QAM UHF: 4FSK BLE: GFSK 2.4G WLAN: 802.11b(DSSS):CCK,DQPSK,DBPSK 802.11g/n(OFDM):BPSK,QPSK,16-QAM,64-QAM 5G WIFI: 802.11a(OFDM): BPSK,QPSK,16-QAM,64-QAM 802.11n(OFDM): BPSK,QPSK,16-QAM,64-QAM 802.11ac(OFDM): BPSK,QPSK,16-QAM,64-QAM,256-QAM



	Antenna gain:	GSM / WCDMA / LTE :0.5dBi UHF:4dBi Bluetooth/2.4G WLAN/5G WLAN: 3dBi
	Antenna Designation:	GSM / WCDMA / LTE :Internal Antenna UHF: Rod Antenna Bluetooth/2.4G WLAN/5G WLAN: Fixed External antenna
Rating	Output: support MTK PE+ 1.1/2.0 9V/2A support USB PD 12V/1.25A support 5V/3A	
Battery	Rated Voltage:7.4V Capacity: 6500	
Adapter:	Input: 100-240V AC, 50/60Hz, 0.5A Output: DC 5V, 3.0A 15.0W DC 9V, 1.0A 18.0W DC 12V, 1.5A 18.0W	
Hardware Version	N/A	
Software Version	N/A	



1.2 TEST FACTORY

SHENZHEN STS TEST SERVICES CO., LTD

Add. : 101, Building B, Zhuoke Science Park, No.190 Chongqing Road, ZhanChengShequ, Fuhai Sub-District, Bao'an District, Shenzhen, Guang Dong, China

FCC test Firm Registration Number: 625569

IC test Firm Registration Number: 12108A

A2LA Certificate No.: 4338.01

2. FCC 47CFR §2.1091 REQUIREMENT

2.1 TEST STANDARDS

The limit for Maximum Permissible Exposure (MPE) specified in FCC 1.1310 is followed. The gain of the antennas used in the product is extracted from the Antenna data sheets provided and also the maximum total power input to the antenna is measured. Through the Friis transmission formula and the maximum gain of the antenna, we can calculate the distance, away from the product, where the limit of MPE is reached.

Although the Friis Transmission formula is far field assumption, the calculated result of that is an over-prediction for near field power density. It is taken as worst case to specify the safety range.

2.2 LIMIT

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environmental impact of the human exposure to radio-frequency (RF) radiation as specified in 1.1307 (b)

Limits for Maximum Permissible Exposure (MPE)

Frequency Range (MHz)	Electric Field Strength (V/m)	Magnetic Field Strength (A/m)	Power Density (mW/cm ²)
Limits for Occupational / controlled Exposures			
300 - 1500	--	--	F/300
1500 – 100000	--	--	5.0
Limits for General population / Uncontrolled Exposure			
300 - 1500	--	--	F/1500
1500 – 100000	--	--	1.0

F= Frequency in MHz

Friss Formula

Friss Transmission Formula: $P_d = (P_{out} * G) / (4 * \pi * r^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

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

If we know the maximum gain of the antenna and the total output power to the antenna, through calculation, we will know MPE value at distance 20cm.



2.3 TEST RESULT

Turn up

Mode	Detector	Turn up Power
GSM 850	AV	32±1dBm
GSM 1900	AV	29±1dBm
WCDMA Band 2	AV	23±1dBm
WCDMA Band 4	AV	23±1dBm
WCDMA Band 5	AV	23±1dBm
LTE Band 2	AV	24±1dBm
LTE Band 4	AV	24±1dBm
LTE Band 5	AV	24±1dBm
LTE Band 7	AV	23±1dBm
LTE Band 12	AV	24±1dBm
LTE Band 13	AV	24±1dBm
LTE Band 25	AV	26±1dBm
LTE Band 26	AV	24±1dBm
LTE Band 38	AV	24±1dBm
LTE Band 41	AV	23±1dBm
UHF	AV	30±1dBm
BLE	AV	1±1dBm
2.4G WLAN	AV	16±4dBm
5G WLAN	AV	12±3dBm

Function	Duty cycle	Duty cycle fator
GSM	12.50%	-9.03
GPRS(1slot)	12.50%	-9.03
GPRS(2slot)	25.00%	-6.02
GPRS(3slot)	37.50%	-4.26
GPRS(4slot)	50.00%	-3.01
WCDMA/HSPA	100%	0.00
FDD-LTE	100%	0.00
TDD-LTE	63.30%	-1.99



Protocol	Fre. (MHz)	Separati on distance (cm)	Max Turn up power (dBm)	ANT Gain (dBi)	Max EIRP (mW)	Power Density (mW/cm ²)	Limit (mW/cm ²)	Ratio	Result
GSM 850	824	80	33.00	0.5	279.840	0.003	0.549333	0.0063	Pass
GSM 1900	1850	80	30.00	0.5	140.252	0.002	1	0.0017	Pass
WCDMA Band 2	1850	80	24.00	0.5	281.838	0.004	1	0.0035	Pass
WCDMA Band 4	1710	80	24.00	0.5	281.838	0.004	1	0.0035	Pass
WCDMA Band 5	824	80	24.00	0.5	281.838	0.004	0.549333	0.0064	Pass
LTE Band 2	1850	80	25.00	0.5	354.813	0.004	1	0.0044	Pass
LTE Band 4	1710	80	25.00	0.5	354.813	0.004	1	0.0044	Pass
LTE Band 5	824	80	25.00	0.5	354.813	0.004	0.549333	0.0080	Pass
LTE Band 7	2500	80	24.00	0.5	281.838	0.004	1	0.0035	Pass
LTE Band 12	699	80	25.00	0.5	354.813	0.004	0.466	0.0095	Pass
LTE Band 13	777	80	25.00	0.5	354.813	0.004	0.518	0.0085	Pass
LTE Band 25	1850	80	27.00	0.5	562.341	0.007	1	0.0070	Pass
LTE Band 26	814	80	25.00	0.5	354.813	0.004	0.542667	0.0081	Pass
LTE Band 38	2570	80	25.00	0.5	224.388	0.003	1	0.0028	Pass
LTE Band 41	2496	80	24.00	0.5	178.238	0.002	1	0.0022	Pass
UHF	421.05	80	31.00	4	3162.278	0.0393	0.2807	0.1401	Pass
BLE	2440	80	2.00	3	3.162	0.0006	1	0.0006	Pass
2.4G WLAN	2462	80	20.00	3	199.526	0.0397	1	0.0397	Pass
5G WLAN	5300	80	15.00	3	63.096	0.0126	1	0.0126	Pass



Multiple transmission(Worst case):

LTE Band 12+UHF+BLE= $0.095+0.1401+0.0006=0.2357 < 1$

LTE Band 12+UHF+2.4G WLAN= $0.095+0.1401+0.0397=0.2748 < 1$

LTE Band 12+UHF+5G WLAN= $0.095+0.1401+0.2477= < 1$

Note: 1. The Maximum power is less than the limit, complies with the exemption requirements

2. ERP = EIRP - 2.15

※※※※※END OF THE REPORT※※※※※