

MRT Technology (Suzhou) Co., Ltd Phone: +86-512-66308358

Web: www.mrt-cert.com

Report No.: 2302RSU008-U4 Report Version: V01 Issue Date: 2024-02-28

RF Exposure Evaluation Declaration

FCC ID: 2AUBBHSA-MAC

Applicant: China StarWin Science & Technology Co., Ltd

Product: Phased Array Satellite Communication Terminal

Model No.: KaWin

Serial Model No.: HSA-MAC, HT-ESA, ESA-MAC, HSA-PAC, HSA-FAC,

ESA-IOT-Ka

Brand Name: Star Win

FCC Classification: Digital Transmission System (DTS)

Licensed Non-Broadcast Station Transmitter (TNB)

FCC Rule Part(s): FCC Part 2.1091

Result: Complies

Evaluation Date: 2024-01-11

Approved By:

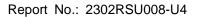
| Sobin Wu | Robin Wu | Robin

The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standards through the calibration of the equipment and evaluated measurement uncertainty herein.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Suzhou) Co., Ltd.

Template Version: 0.0 1 of 8





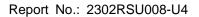
Revision History

Report No.	Version	Description	Issue Date	Note
2302RSU008-U4	V01	Initial Report	2024-02-28	Valid



CONTENTS

Des	cription		Page
1.	Gene	eral Information	4
	1.1.	Applicant	4
	1.2.	Manufacturer	4
	1.3.	Testing Facility	4
	1.4.	Product Information	5
	1.5.	Antenna Details	5
	1.6.	Device Classification	6
	1.7.	Applied Standards	6
2.	RF E	xposure Evaluation	7
	2.1.	Test Limits	7
	2.2.	MPE Exemptions	8
	2.3.	Test Result	11





1. General Information

1.1. Applicant

China StarWin Science & Technology Co.,Ltd

Floor 3th, Building B, No. 2 Keyuannan 2nd Road, High-tech Zone, Chengdu, China

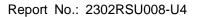
1.2. Manufacturer

China StarWin Science & Technology Co.,Ltd

Floor 3th, Building B, No. 2 Keyuannan 2nd Road, High-tech Zone, Chengdu, China

1.3. Testing Facility

\boxtimes	Test Site – MRT Suzhou Laboratory							
	Laboratory Location (Suzhou - Wuzhong)							
	D8 Building, No.2 Tian'edang Rd., Wuzhong Economic Development Zone, Suzhou, China							
	Laboratory Location (Suzhou - SIP)							
	4b Building, Liando U Valley, No.200 Xingpu Rd., Shengpu Town, Suzhou Industrial Park, China							
	Laboratory Accre	ditations						
	A2LA: 3628.01		CNAS	i: L10551				
	FCC: CN1166		ISED:	CN0001				
	VCCI:	□R-20025	□G-20034	□C-20020	□T-20020			
	VCCI:	□R-20141	□G-20134	□C-20103	□T-20104			
	Test Site – MRT Shenzhen Laboratory							
	Laboratory Locat	ion (Shenzhen)						
	1G, Building A, Jur	nxiangda Building,	Zhongshanyuan Roa	d West, Nanshan Dis	strict, Shenzhen, China			
	Laboratory Accre	ditations						
	A2LA: 3628.02	.02 CNAS: L10551						
	FCC: CN1284		ISED:	CN0105				
	Test Site - MRT T	aiwan Laboratory	1					
	Laboratory Locat	ion (Taiwan)						
	No. 38, Fuxing 2nd	d Rd., Guishan Dis	t., Taoyuan City 333,	Taiwan (R.O.C.)				
	Laboratory Accre	ditations						
	TAF: 3261							
FCC: 291082, TW3261 ISED: TW3261								





1.4. Product Information

Product Name	Phased Array Satellite Communication Terminal		
Model No.	KaWin		
Serial Model No.:	HSA-MAC, HT-ESA, ESA-MAC, HSA-PAC, HSA-FAC, ESA-IOT-Ka		
Wi-Fi Specification	802.11b/g/n		
Satallita Specification	Transmit: 29.25~30.00GHz		
Satellite Specification	Receive: 18.3~18.8GHz, 19.7 ~ 20.2GHz		
GNSS Specification	GPS, BDS		
	HSA-MAC, HT-ESA,HSA-PAC, HSA-FAC, ESA-IOT-Ka:		
Hardware Version	ACU-2.0,ESA-DRV-V1.0, ZL60P-DRV-V5.1		
	ESA-MAC: ACU-2.0, ESA-DRV-V1.0		
Software Version	KA_1.12B		
Antenna Information	Refer to section 1.5		
Power Type	By Adapter		
Operating Temperature	-40 ~ 70 °C		
Accessories			
Adapter	Model: HEP-480-36A		
	Input: 100-240V ~ 50/60Hz 2.0A		
	Output: 36V=13.3A		
	Rated Power: 478.8W		
	Input: 100-240V ~ 50/60Hz 2.0A Output: 36V=13.3A		

Note:

- 1. The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.
- 2. The differences between the models are the usage scenario, scanning mode and the bracket, which do not affect the RF.

1.5. Antenna Details

Antenna Type	Frequency Band (MHz)	Antenna Gain (dBi)
PCB Antenna	2412 ~ 2462	4.0
Phased-array Antenna	20250 20000	37.7dBi (in range of ±15 degree)
	29250 ~ 30000	10.0dBi (out range of ±15 degree)



1.6. Device Classification

According to the user manual, the antenna of this device is at least 185cm(For out range of ±5 degrees on-axis) and 3100cm(For ±5 degrees on-axis) away from the body of the user, this device is classified as a Mobile Device. So, the RF exposure evaluation requirements of § 2.1091 for mobile device exposure conditions subject to MPE limits.

1.7. Applied Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

• FCC Part 2.1091 & KDB 447498 D04 Interim General RF Exposure Guidance v01



2. RF Exposure Evaluation

2.1. Test Limits

According to FCC 1.1310: 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 1.1307(b)

Limits For Maximum Permissible Exposure (MPE)

Frequency Range	Electric Field	Magnetic Field	Power Density	Average Time				
(MHz)	Strength (V/m)	Strength (A/m)	(mW/cm ²)	(Minutes)				
	(A) Limits for Occupational/ Control Exposures							
0.3-3.0	614	1.63	*(100)	≤6				
3.0-30	1842/f	4.89/f	*(900/f²)	<6				
30-300	61.4	0.163	1.0	<6				
300-1,500			f/300	<6				
1,500-100,000			5	<6				
	(B) Limits for Gen	eral Population/ Uncor	ntrolled Exposures					
0.3-1.34	614	1.63	*(100)	<30				
1.34-30	824/f	2.19/f	*(180/f²)	<30				
30-300	27.5	0.073	0.2	<30				
300-1,500			f/1500	<30				
1,500-100,000			1.0	<30				

f= frequency in MHz. * = Plane-wave equivalent power density.



2.2. MPE Exemptions

For single RF sources (i.e., any single fixed RF source, mobile device, or portable device, as defined in paragraph §1.1307(b)(2) of this section): A single RF source is exempt if:

(Option A) The available maximum time-averaged power is no more than 1 mW, regardless of separation distance. This exemption may not be used in conjunction with other exemption criteria other than those in paragraph §1.1307(b)(3)(ii)(A) of this section.

Medical implant devices may only use this exemption and that in paragraph §1.1307(b)(3)(ii)(A);

(Option B) Or the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P (mW) described in the following formula. This method shall only be used at separation distances (cm) from 0.5 centimeters to 40 centimeters and at frequencies from 0.3 GHz to 6 GHz (inclusive). P is given by:

$$P th(mW) = \{ERP_{20cm}(d / 20cm)^{x} d \le 20cm\}$$

$$P th(mW) = \{ERP_{20cm} 20cm < d \le 40cm\}$$

Where

$$x = -\log_{10}\left(\frac{60}{ERP_{20Cm}\sqrt{f}}\right)$$
 and f is in GHz;

and

$$ERP_{20cm}(mW) = \{2040f \ 0.3GHz \le f < 1.5GHz\}$$

$$ERP_{20cm}(mW) = \{3060 \ 1.5GHz \le f \le 6GHz \}$$

(Option C) Or using Table 1 and the minimum separation distance (R in meters) from the body of a nearby person for the frequency (f in MHz) at which the source operates, the ERP (watts) is no more than the calculated value prescribed for that frequency. For the exemption in Table 1 to apply, R must be at least $\lambda/2\pi$, where λ is the free-space operating wavelength in meters. If the ERP of a single RF source is not easily obtained, then the available maximum time-averaged power may be used in lieu of ERP if the physical dimensions of the radiating structure(s) do not exceed the electrical length of $\lambda/4$ or if the antenna gain is less than that of a half-wave dipole (1.64 linear value).



Table 1 to §1.1307(b)(3)(i)(C) - Single RF Sources Subject to Routine Environmental Evaluation

RF Source Frequency (MHz)	Threshold ERP (watts)
0.3-1.34	1920R ²
1.34-30	3450R ² /f ²
30-300	3.83R ²
300-1,500	0.0128R ² f
1,500-100,000	19.2R ²

For multiple RF sources: Multiple RF sources are exempt if:

(A) The available maximum time-averaged power of each source is no more than 1 mW and there is a separation distance of two centimeters between any portion of a radiating structure operating and the nearest portion of any other radiating structure in the same device, except if the sum of multiple sources is less than 1 mW during the time-averaging period, in which case they may be treated as a single source (separation is not required). This exemption may not be used in conjunction with other exemption criteria other than those is paragraph §1.1307(b)(3)(i)(A) of this section. Medical implant devices may only use this exemption and that in paragraph §1.1307(b)(3)(i)(A).

(B) in the case of fixed RF sources operating in the same time-averaging period, or of multiple mobile or portable RF sources within a device operating in the same time averaging period, if the sum of the fractional contributions to the applicable thresholds is less than or equal to 1 as indicated in the following equation.

$$\sum_{i=1}^{a} \frac{P_i}{P_{th,i}} + \sum_{j=1}^{b} \frac{ERP_j}{ERP_{th,j}} + \sum_{k=1}^{c} \frac{Evaluated_k}{Exposure\ Limit_k} \le 1$$

Where:

 \boldsymbol{a} = number of fixed, mobile, or portable RF sources claiming exemption using paragraph §1.1307(b)(3)(i)(B) of this section for P_{th} , including existing exempt transmitters and those being added.

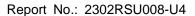
b = number of fixed, mobile, or portable RF sources claiming exemption using paragraph 1.1307(b)(3)(i)(C) of this section for Threshold ERP, including existing exempt transmitters and those being added.

c = number of existing fixed, mobile, or portable RF sources with known evaluation for the specified minimum distance including existing evaluated transmitters.

 P_i = the available maximum time-averaged power or the ERP, whichever is greater, for fixed, mobile, or portable RF source i at a distance between 0.5 cm and 40 cm (inclusive).

 $P_{th,i}$ = the exemption threshold power (P_{th}) according to paragraph §1.1307(b)(3)(i)(B) of this section for fixed, mobile, or portable RF source i.

 ERP_j = the ERP of fixed, mobile, or portable RF source j.

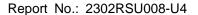




 $ERP_{th,j}$ = exemption threshold ERP for fixed, mobile, or portable RF source j, at a distance of at least $\lambda/2\pi$ according to the applicable formula of paragraph $\S1.1307(b)(3)(i)(C)$ of this section.

Evaluated_k = the maximum reported SAR or MPE of fixed, mobile, or portable RF source k either in the device or at the transmitter site from an existing evaluation at the location of exposure.

Exposure Limit_k = either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable RF source k, as applicable from §1.1310 of this chapter.





2.3. Test Result

Product	Phased Array Satellite Communication Terminal
Test Item	RF Exposure Evaluation

For single RF source, Option C

For ±15 degrees on-axis:

Antenna Gain: Refer to clause 1.5.

Test Mode	Frequency Band (MHz)	Tune-up Conducted Power (dBm)	Antenna Gain (dBi)	Tune up EIRP (dBm)
802.11b/g/n/	2412 ~ 2462	16.61	4.00	20.61
Satellite	29250 ~ 30000			78.71

Note: Tune-up power was declared by manufacturer.

Test Mode	λ/2π	R	Tune-up ERP	Tune-up ERP	Threshold ERP
	(m)	(m)	(dBm)	(W)	(W)
802.11b/g/n/	0.0198	49	18.46	0.07	46099.2
Satellite	0.0016	49	76.56	45289.76	46099.2

Note: R is from user manual.

Note:

WLAN 2.4GHz Band and Satellite can transmit simultaneously.

The Max Simultaneous Transmission = 0.07/46099.2 + 45289.76/46099.2 = 0.982 < 1

Therefore, the safety Distance is 49 m (for ± 15 degrees on-axis).



Report No.: 2302RSU008-U4

For out range of ± 15 degrees on-axis:

Test Mode	Frequency Band (MHz)	Tune-up Conducted Power (dBm)	Antenna Gain (dBi)	Tune up EIRP (dBm)
802.11b/g/n/	2412 ~ 2462	16.61	4.00	20.61
Satellite	29250 ~ 30000			51.01 Note 2

Note 1: Tune-up power was declared by manufacturer.

Note 2: The level is calculated by the difference of the antenna gain according to the section 1.5.

Test Mode	λ/2π	R	Tune-up ERP	Tune-up ERP	Threshold ERP
	(m)	(m)	(dBm)	(W)	(W)
802.11b/g/n/	0.0198	2.1	18.46	0.07	84.67
Satellite	0.0016	2.1	48.86	76.91	84.67

Note: R is from user manual.

Note:

WLAN 2.4GHz Band and Satellite can transmit simultaneously.

The Max Simultaneous Transmission = 0.07/84.67 + 76.91/84.67 = 0.909 < 1

Therefore, the safety Distance is 2.1 m (for out of range ±15 degrees on-axis).

The End	
---------	--