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Report No.: 2404RSU015-U3 Report Version: Issue Date: 2024-05-15

# **RF Exposure Evaluation Declaration**

FCC ID: 2BGFA-TFW5-ADS27

**Applicant:** Shenzhen Quansheng Technology Co. Ltd

**Product:** Microwave sensor

Model No.: TFW5-ADS27

FCC Rule Part(s): FCC Part 2.1091

Result: Complies

**Evaluation Date:** 2024-05-09

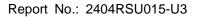
**Reviewed By:** Vincent Yu Approved By: TESTING LABORATORY Robin Wu CERTIFICATE #3628.01

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.

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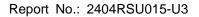
## **Revision History**

Report No.	Version	Description	Issue Date	Note
2404RSU015-U3	V01	Initial Report	2024-05-15	Valid



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#### 1. General Information

#### 1.1. Applicant

Shenzhen Quansheng Technology Co. Ltd

202, Building P, 163 Banxuegang Avenue, Gangtou Community, Bantian Street, Longgang District

#### 1.2. Manufacturer

Shenzhen Quansheng Technology Co. Ltd

202, Building P, 163 Banxuegang Avenue, Gangtou Community, Bantian Street, Longgang District

#### 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 Locat	tion (Suzhou - SIP	)				
	4b Building, Liand	o U Valley, No.200	Xingpu Rd., Shengpi	u Town, Suzhou Indu	strial Park, China		
	Laboratory Accre	editations					
	A2LA: 3628.01		CNAS	S: L10551			
	FCC: CN1166		ISED:	CN0001			
	N/OOL	□R-20025	□G-20034	□C-20020	□T-20020		
	VCCI:	□R-20141	□G-20134	□C-20103	□T-20104		
	Test Site - MRT S	Shenzhen Laborat	ory				
	Laboratory Locat	tion (Shenzhen)					
	1G, Building A, Ju	nxiangda Building,	Zhongshanyuan Roa	d West, Nanshan Di	strict, Shenzhen,		
	China						
	Laboratory Accreditations						
	A2LA: 3628.02 CNAS: L10551						
	FCC: CN1284 ISED: CN0105						
	Test Site – MRT Taiwan Laboratory						
Laboratory Location (Taiwan)							
	No. 38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C.)						
	Laboratory Accreditations						
	TAF: 3261						
	FCC: 291082, TW	3261	ISED:	TW3261			



#### 1.4. Product Information

Product	Microwave sensor
Model No.	TFW5-ADS27
Wireless Specification	24.00~24.25GHz
Antenna Information	Refer to section 1.5
Operating Temperature	-20~60°C
Power Type	4.75 ~ 5.25VDC (Nominal 5VDC)

Note: The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.

#### 1.5. Antenna Details

Working Frequency Range	24.00~24.25GHz	
Modulation type	FSK	
Antenna Type	PCB Antenna	

Note: The information of antenna was provided by the manufacturer.

#### 1.6. Device Classification

According to the user manual, 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. 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 <sup>2</sup> )	(Minutes)
	(A) Limits fo	r Occupational/ Contro	l Exposures	
0.3-3.0	614	1.63	*(100)	≤6
3.0-30	1842/f	4.89/f	*(900/f <sup>2</sup> )	<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	trolled Exposures	
0.3-1.34	614	1.63	*(100)	<30
1.34-30	824/f	2.19/f	*(180/f <sup>2</sup> )	<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  $\lambda$  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)	<ul> <li>Single RF Soul</li> </ul>	ces Subject to Routine	Environmental Evaluation

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

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:

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 §1.1307(b)(3)(i)(C) of this section.

**Evaluated**<sub>k</sub> = 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**<sub>k</sub> = 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.



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#### 2.3. Calculated Result

Product	Microwave sensor
Test Item	RF Exposure Evaluation

Test Mode	Frequency Band	Fundamental	Radiated EIRP	Tune-up ERP	Tune-up ERP
	(GHz)	Radiated Emission	(dBm)	(dBm)	(mW)
		(dBµV/m)			
24GHz	24.00 ~ 24.25	107.212	12.012	9.862	9.687

#### Notes:

- 1. The Fundamental Radiated Emission was from report No.: 2404RSU015-U1.
- 2. Radiated EIRP (dBm)= Fundamental Radiated Emission (dB $\mu$ V/m) 95.2; The distance of testing is 3m.
- 3. Tune-up ERP (dBm) = Radiated EIRP (dBm) 2.15. Tune-up ERP (mW) =  $10^{\text{(Tune-up ERP (dBm) / 10)}}$ .

#### For single RF source, Option C

Test Mode	Frequency Band	λ/2π	R	Tune-up ERP	Thresholds ERP
	(GHz)	(m)	(m)	(mW)	(mW)
24GHz	24.00 ~ 24.25	0.0020	0.20	9.687	768

Note: R is from user manual.

#### **CONCLUSION:**

The device qualifies for RF exposure test exemption at 20cm distance.

 The End	