

### 1 Cover Page

# RF Exposure Evaluation Report

**Application No.:** SHCR2109000193HS  
**FCC ID:** 2A3CT-IC087W  
**IC:** 27782-IC087W  
**Applicant:** MQRS Holdings Inc.  
**Address of Applicant:** 2225 Erin Mills Parkway Unit 29i, L7A4M7 Mississauga, Ontario, L5K 1T9  
Canada  
**Manufacturer:** SHANGHAI Niaoyu Huaxiang Pet Co., Ltd  
**Address of Manufacturer:** Building H, Xuhui Vanke Center, No.55 Ding'an Road, Xuhui District,  
Shanghai.  
**Factory:** SHANGHAI Niaoyu Huaxiang Pet Co., Ltd  
**Address of Factory:** Building H, Xuhui Vanke Center, No.55 Ding'an Road, Xuhui District,  
Shanghai.  
**Equipment Under Test (EUT):**  
**EUT Name:** Purebite Smart Pet Feeder (Purechew Mini Smart Pet Feeder)  
**Model No.:** IC087W  
**Trade mark:** INSTACHEW  
FCC Rules 47 CFR §2.1093  
**Standard(s) :** KDB 447498 D04 interim General RF Exposure Guidance v01  
RSS-102 Issue 5 Amendment 1 (February 2, 2021)  
**Date of Receipt:** 2021-09-15  
**Date of Test:** 2021-10-29 to 2021-11-11 & 2022-11-29 to 2022-12-09  
**Date of Issue:** 2022-12-13

<b>Test Result:</b>	<b>Pass*</b>
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\* In the configuration tested, the EUT complied with the standards specified above.

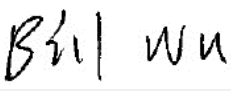
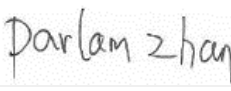
Parlam Zhan

Parlam Zhan  
Laboratory Manager





Revision Record			
Version	Description	Date	Remark
00	Original	2022-12-13	/

Authorized for issue by:			
		 <hr/> <b>Bill Wu/Project Engineer</b>	
		 <hr/> <b>Parlam Zhan / Reviewer</b>	



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2 Contents

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### 3 General Information

#### 3.1 General Description of E.U.T.

Power supply:	DC 6V By 4*AA size batteries or DC 5V From Type C
S/N:	83878IC087XXXXXX
Firmware version:	V2.0.1
Product Type:	<input type="checkbox"/> Portable device
	<input type="checkbox"/> Mobile device
	<input checked="" type="checkbox"/> Fixed device

#### 3.2 Details of E.U.T.

##### 2.4G WiFi

Antenna Gain:	2.54dBi (Provided by manufacturer)
Antenna Type:	PCB Antenna
Channel Spacing:	5MHz
Modulation Type:	802.11b: DSSS (CCK, DQPSK, DBPSK) 802.11g/n: OFDM (64QAM, 16QAM, QPSK, BPSK)
Number of Channels:	802.11b/g/n(HT20):11
Operation Frequency:	802.11b/g/n(HT20): 2412MHz to 2462MHz
Date Rate:	802.11b:1/2/5.5./11Mbps 802.11g:6/9/12/18/24/36/48/54Mbps 802.11n:MCS0-MCS7

##### BLE

Operation Frequency:	2402MHz to 2480MHz
Bluetooth Version:	V4.2 LE
Modulation Type:	GFSK
Date Rate:	1Mbps
Number of Channels:	40
Channel Spacing:	2MHz
Antenna Type:	PCB Antenna
Antenna Gain:	2.54dBi (Provided by manufacturer)

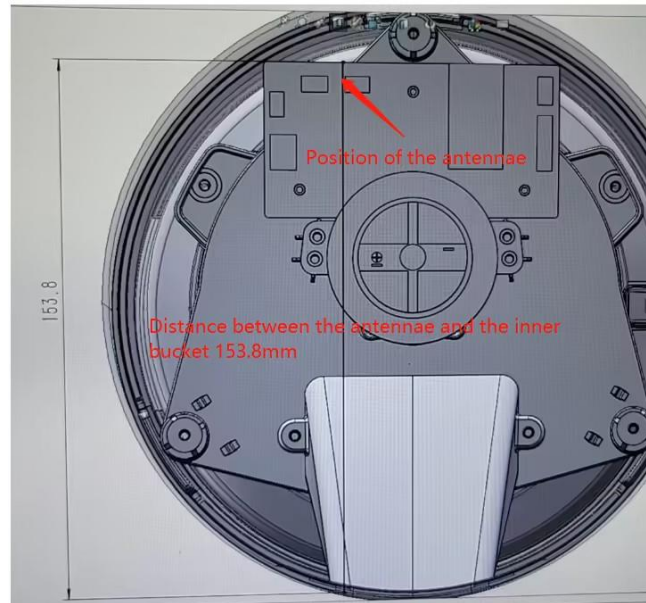
#### 3.3 Separation Distance

Separation distance between the antenna to person (R):	15.38cm(min)
Remark: This minimum test separation distance is determined by the smallest distance from the antenna and radiating structures or outer surface of the device, according to the host form factor, exposure conditions and platform requirements, to any part of the body or extremity of a user or bystander.	



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### 3.4 Test Location

All tests were performed at:

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd.

588 West Jindu Road, Xinqiao, Songjiang, 201612 Shanghai, China.

Tel: +86 21 6191 5666

Fax: +86 21 6191 5678

No tests were sub-contracted.

Note:

1. SGS is not responsible for wrong test results due to incorrect information (e.g. max. clock frequency, highest internal frequency, antenna gain, cable loss, etc ) is provided by the applicant. (if applicable).
2. SGS is not responsible for the authenticity, integrity and the validity of the conclusion based on results of the data provided by applicant. (if applicable).

### 3.5 Test Facility

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

- **A2LA (Certificate No. 6332.01)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. is accredited by the American Association for Laboratory Accreditation(A2LA).

- **FCC (Designation Number: CN1301)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been recognized as an accredited testing laboratory.

- **ISED (CAB Identifier: CN0020)**

SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. EMC Laboratory has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory  
Company Number: 8617A

- **VCCI (Member No.: 3061)**

The 3m Semi-anechoic chamber and Shielded Room of SGS-CSTC Standards Technical Services (Shanghai) Co., Ltd. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-13868, C-14336, T-12221, G-10830 respectively.



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## 4 FCC Radiofrequency radiation exposure limits

Test exemptions apply for devices used in general population/uncontrolled exposure environments, according to the SAR-based, or MPE-based exemption thresholds.

### 4.1 Blanket 1 mW Blanket Exemption

The 1 mW Blanket Exemption of §1.1307(b)(3)(i)(A) applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power of no more than 1 mW, regardless of separation distance.

The 1-mW blanket exemption applies at separation distances less than 0.5 cm, including where there is no separation. This exemption shall not be used in conjunction with other exemption criteria other than those for multiple RF sources in paragraph §1.1307(b)(3)(ii)(A).

The 1-mW exemption is independent of service type and covers the full range of 100 kHz to 100 GHz, but it shall not be used in conjunction with other exemption criteria or in devices with higher-power transmitters operating in the same time-averaging period. Exposure from such higher-power transmitters would invalidate the underlying assumption that exposure from the lower-power transmitter is the only contributor to SAR in the relevant volume of tissue.

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

### 4.2 MPE-based Exemption

General frequency and separation-distance dependent MPE-based effective radiated power (ERP) thresholds are in Table B.1 [Table 1 of §1.1307(b)(1)(i)(C)] to support an exemption from further evaluation from 300 kHz through 100 GHz. 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).



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**Table B.1—Thresholds For Single RF Sources Subject to Routine Environmental Evaluation**

RF Source Frequency			Minimum Distance			Threshold ERP
$f_L$ MHz		$f_H$ MHz	$\lambda_L / 2\pi$		$\lambda_H / 2\pi$	W
0.3	–	1.34	159 m	–	35.6 m	1,920 R <sup>2</sup>
1.34	–	30	35.6 m	–	1.6 m	3,450 R <sup>2</sup> /f <sup>2</sup>
30	–	300	1.6 m	–	159 mm	3.83 R <sup>2</sup>
300	–	1,500	159 mm	–	31.8 mm	0.0128 R <sup>2</sup> f
1,500	–	100,000	31.8 mm	–	0.5 mm	19.2R <sup>2</sup>

Subscripts L and H are low and high;  $\lambda$  is wavelength.  
R: Separation distance between the antenna to person

The table applies to any RF source (i.e. single fixed, mobile, and portable transmitters) and specifies power and distance criteria for each of the five frequency ranges used for the MPE limits. These criteria apply at separation distances from any part of the radiating structure of at least  $\lambda/2\pi$ . The thresholds are based on the general population MPE limits with a single perfect reflection, outside of the reactive near-field, and in the main beam of the radiator.

### 4.3 SAR-based Exemption

SAR-based thresholds are derived based on frequency, power, and separation distance of the RF source. The formula defines the thresholds in general for either available maximum time-averaged power or maximum time-averaged ERP, whichever is greater.

If the ERP of a device is not easily determined, such as for a portable device with a small form factor, the applicant may use the available maximum time-averaged power exclusively if the device antenna or radiating structure does not exceed an electrical length of  $\lambda/4$ .

As for devices with antennas of length greater than  $\lambda/4$  where the gain is not well defined, but always less than that of a half-wave dipole (length  $\lambda/2$ ), the available maximum time-averaged power generated by the device may be used in place of the maximum time-averaged ERP, where that value is not known.

The separation distance is the smallest distance from any part of the antenna or radiating structure for all persons, during operation at the applicable ERP. In the case of mobile or portable devices, the separation distance is from the outer housing of the device where it is closest to the antenna.

The SAR-based exemption formula of §1.1307(b)(3)(i)(B), repeated here as Formula (B.2), applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power or effective radiated power (ERP), whichever is greater, of less than or equal to the threshold  $P_{th}$  (mW).

This method shall only be used at separation distances from **0.5cm to 40cm** and at frequencies from 0.3 GHz to 6 GHz (inclusive).  $P_{th}$  is given by Formula (B.2).





$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}}(d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases} \quad (\text{B. 2})$$

where

$$x = -\log_{10} \left( \frac{60}{ERP_{20 \text{ cm}} \sqrt{f}} \right)$$

and  $f$  is in GHz,  $d$  is the separation distance (cm), and  $ERP_{20\text{cm}}$  is per Formula (B.1).

Limit calculation				
Frequency range(GHz)	Frequency(GHz)	X	d(cm)	Pth (mW)
0.3~1.5	<b>0.45</b>	1.011	<b>1</b>	<b>44.373</b>
1.5~6	<b>2.462</b>	1.903	<b>15.38</b>	<b>1856.157</b>
1.5~6	<b>2.48</b>	1.905	<b>15.38</b>	<b>1855.386</b>

#### 4.4 RF Exposure Test Exemptions for Simultaneous Transmission

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 in paragraph (b)(3)(i)(A) of this section. Medical implant devices may only use this exemption and that in paragraph (b)(3)(i)(A).

Either SAR-based or MPE-based exemption may be considered for test exemption for fixed, mobile, or portable device exposure conditions; therefore, the contributions from each exemption in conjunction with the measured SAR (Evaluated $k$  term) shall be used to determine exemption for simultaneous transmission. 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.

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

Where:

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



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**b** = number of fixed, mobile, or portable RF sources claiming exemption using paragraph (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<sub>i</sub>** = 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<sub>th,i</sub>** = the exemption threshold power (P<sub>th</sub>) according to paragraph (b)(3)(i)(B) of this section for fixed, mobile, or portable RF source *i*.

**ERP<sub>j</sub>** = the ERP of fixed, mobile, or portable RF source *j*.

**ERP<sub>th,j</sub>** = 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 (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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## 5 IC Radiofrequency radiation exposure limits:

According to RSS-102 section 2.5.1, SAR evaluation is required if the separation distance between the user and/or bystander and the antenna and/or radiating element of the device is less than or equal to 20 cm, except when the device operates at or below the applicable output power level (adjusted for tune-up tolerance) for the specified separation distance

MHz	5	10	15	20	25	30	35	40	45	50	mm
≤300	71	101	132	162	193	223	254	284	315	345	mW
450	52	70	88	106	123	141	159	177	195	213	
835	17	30	42	55	67	80	92	105	117	130	
1900	7	10	18	34	60	99	153	225	316	431	
2450	4	7	15	30	52	83	123	173	235	309	
3500	2	6	16	32	55	86	124	170	225	290	
5800	1	6	15	27	41	56	71	85	97	106	

Output power level shall be the higher of the maximum conducted or equivalent isotropically radiated power (e.i.r.p.) source-based, time-averaged output power. For controlled use devices where the 8 W/kg for 1 gram of tissue applies, the exemption limits for routine evaluation are multiplied by a factor of 5. For limb-worn devices where the 10 gram value applies, the exemption limits for routine evaluation in Table 1 are multiplied by a factor of 2.5. If the operating frequency of the device is between two frequencies located in Table 1, linear interpolation shall be applied for the applicable separation distance. For test separation distance less than 5 mm, the exemption limits for a separation distance of 5 mm can be applied to determine if a routine evaluation is required.

The practical use condition for this device is as a head accessories. So the applicable limit is 1-g extremity SAR

For 2.4G band device, the limit is  $P_{max} \leq 309mW$



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## 6 Measurement and Calculation

### 6.1 Maximum transmit power

The Power Data is based on the RF Test Report SHCR210900019301 & SHCR210900019302

2.4G WiFi

Test Mode	Test Channel	Ant	Power [dBm]	Power [mW]
11B	2412	Ant1	15.59	36.22
11B	2437	Ant1	15.78	<b>37.84</b>
11B	2462	Ant1	15.76	37.67
11G	2412	Ant1	11.61	14.49
11G	2437	Ant1	12.45	17.58
11G	2462	Ant1	12.25	16.79
11N20SISO	2412	Ant1	11.65	14.62
11N20SISO	2437	Ant1	12.10	16.22
11N20SISO	2462	Ant1	12.16	16.44

BLE

TestMode	Antenna	Channel	Result[dBm]	Result[mW]
BLE_1M	Ant1	2402	-2.08	<b>0.62</b>
		2440	-2.59	0.55
		2480	-2.79	0.53

### 6.2 RF Exposure Calculation

For single RF source :

	Evaluation method	Separation distance between the antenna to person (R)
<input type="checkbox"/>	Blanket 1 mW Blanket Exemption	Regardless of separation distance
<input type="checkbox"/>	MPE-based Exemption(ERP)	$R \geq (\lambda / 2 \pi)$
<input checked="" type="checkbox"/>	SAR-based Exemption( $P_{th}$ )	$0.5\text{cm} < R < 40\text{cm}$

For 2.4G WiFi :

The Max Output Power is 37.84mW. The best case gain of the antenna is 2.54dBi.

2.54dBi logarithmic terms convert to numeric result is nearly 1.795

According to the formula. calculate the EIRP test result:

$$\text{EIRP} = P \times G = 37.84 \text{ mW} \times 1.795 = 67.92\text{mW} < 1856\text{mW}$$



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For BLE :

The Max Output Power is 0.62mW. The best case gain of the antenna is 2.54dBi.

2.54dBi logarithmic terms convert to numeric result is nearly 1.795

According to the formula. calculate the EIRP test result:

$$\text{EIRP} = P \times G = 0.62 \text{ mW} \times 1.795 = 1.11 \text{ mW} < 1855 \text{ mW}$$

**For multiple RF sources:**

The 2.4G WiFi and BLE modules can simultaneous transmitting, so the maximum rate of MPE is  $67.92/1856 + 1.11/1855 = 0.037 \leq 1$

**Remark:** we used the maximum power between the conducted power and ERP/EIRP to perform RF exposure exemption evaluation.

So, the device is to qualify for SAR test exemption, the exemption report is in lieu of the SAR report.

**For IC:**

For 2.4G WiFi :

$$\text{E.I.R.P.} = P * G = 37.84 \times 1.795 = 67.92 \text{ mW} < 309 \text{ mW}$$

For BLE :

$$\text{E.I.R.P.} = P * G = 0.62 \times 1.795 = 1.11 \text{ mW} < 309 \text{ mW}$$

The 2.4G WiFi and BLE modules can simultaneous transmitting, so the maximum rate of MPE is  $67.92/309 + 1.11/309 = 0.223 < 1$

So the device is exclusion from SAR test.

**--End of the Report--**



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