

SZEMC-TRF-01 Rev. A/1

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RF EXPOSURE EVALUATION REPORT

Application No.:	SZCR2405001735AT					
Applicant:	Shantou Helicute Model Aircraft Industrial Co.,Ltd					
Address of Applicant:	Jiangbei Road, Longtian, Guangyi Street, Chenghai District,Chenghai, Shantou City,Guangdong, Shantou, China					
Manufacturer:	Shantou Helicute Model Aircraft Industrial Co., Ltd					
Address of Manufacturer:	Jiangbei Road, Longtian, Guangyi Street, Chenghai District,Chenghai, Shantou City,Guangdong, Shantou, China					
Factory:	Shantou Helicute Model Aircraft Industrial Co., Ltd					
Address of Factory:	Jiangbei Road, Longtian, Guangyi Street, Chenghai District,Chenghai, Shantou City,Guangdong, Shantou, China					
Equipment Under Test (EUT):					
EUT Name:	Drone					
Model No.:	Please refer to section 3.2					
"	Please refer to section 3.2 of this report which indicates which model was actually tested and which were electrically identical.					
FCC ID:	2AKPP2024HELI2					
Standard(s) :	FCC Rules 47 CFR §2.1091					
	KDB 447498 D04 interim General RF Exposure Guidance v01					
Date of Receipt:	2024-05-14					
Date of Evaluation:	2024-05-23 to 2024-06-29					
Date of Issue:	2024-07-04					
Evaluation Result:	Pass*					

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

Keny. Ku

Keny Xu EMC Laboratory Manager



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	Revision Record								
Version	Chapter	Date	Modifier	Remark					
01		2024-07-04		Original					

Authorized for issue by:		
	Gebin Sun	
	Gebin Sun/Project Engineer	
	Eric Fu	
	Eric Fu/Reviewer	



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3 General Information

3.1 General Description of E.U.T.

	Portable device
Product Type:	⊠ Mobile device
	Fixed device

3.2 Details of E.U.T.

,	Rechargeable battery DC7.6V,1950m/	Ah for Drone				
-	Type-C USB cable:40cm unshielded					
y:						
-requency:	2440MHz to 2471MHz					
Type:	GFSK					
Channels:	32					
acing:	1MHz					
be: I	Portable production					
vpe: I	IPEX Antenna					
ain:	1.97dBi					
Band	Mode	Frequency Range(MHz)	Number of channels			
JNII Band I	802.11a/n(HT20)/ac(HT20):	5180-5240	4			
	802.11n(HT40)/ac(HT40)	5190-5230	2			
	802.11ac(HT80)	5210	1			
JNII Band II-A		5260-5320	4			
			2			
		5290	1			
302.11a: OFDI	M(16QAM, 64QAM, QPSK, BPSK)					
302.11n: OFDI	M(16QAM, 64QAM, QPSK, BPSK)					
302.11ac: OFE	DM(16QAM, 64QAM, 256QAM, QPSK,	BPSK)				
Master						
Without TPC function						
FPC Antenna						
ANT1:2.58dBi						
ANT2: 2.58dB	i					
	Frequency: 2 Type: 0 Channels: 2 acing: 0 pe: 0 ain: 0 Band 0 JNII Band I 0 JNII Band II-A 0 302.11a: OFD 0 302.11ac: OFI 0 Aaster 0 Vithout TPC f 0 FPC Antenna 0 ANT1:2.58dBi 0	Frequency:2440MHz to 2471MHzType:GFSKChannels:32acing:1MHzDee:Portable productionpe:IPEX Antennaain:1.97dBiBandModeJNII Band I802.11a/n(HT20)/ac(HT20): 802.11ac(HT80)JNII Band II-A802.11a/n(HT20)/ac(HT20): 802.11ac(HT80)JNII Band II-A802.11a/n(HT20)/ac(HT20): 802.11ac(HT80)Box802.11a/n(HT20)/ac(HT40) 	requency: 2440MHz to 2471MHz Type: GFSK Channels: 32 acing: 1MHz be: Portable production pe: IPEX Antenna ain: 1.97dBi Band Mode Frequency Range(MHz) JNII Band I 802.11a/n(HT20)/ac(HT20): 5180-5240 802.11n(HT40)/ac(HT40) 5190-5230 802.11ac(HT80) 5210 JNII Band II-A 802.11a/n(HT20)/ac(HT20): 5260-5320 802.11n(HT40)/ac(HT40) 5270-5310 802.11ac(HT80) 5290 802.11ac(HT80) 5290 802.11ac (HT80) 5290 802.11ac (HT80) 5290 802.11ac (HT80) 5290 802.11ac OFDM(16QAM, 64QAM, QPSK, BPSK) 802.11ac: OFDM(16QAM, 64QAM, QPSK, BPSK) 802.11ac: OFDM(16QAM, 64QAM, 256QAM, QPSK, BPSK) Master Without TPC function EPC Antenna NNT1:2.58dBi State			



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Remark:The information in this section is provided by the applicant or manufacturer, SGS is not liable to the accuracy, suitability, reliability or/and integrity of the information.

Declaration of EUT Family Grouping:

Model No.: DRC-445, DRC-447, DRCLS16, DRC-250, DRC-251, H850, H850-1, LS233691, LS233852, H848, H05NL, H05NCL, H07NL, H07NCL, H09NL, H09NCL, M801R, M803R, H805, H805W, H806, H806W, H808, H809HW, H809SW, H811C, H811W, H812R, S812, H815HW, H815SC, H815SW, H816H, H816HC, H816HW, H817, H817C, H817W, H817H, H817HC, H817HW, H818H, H818HW, H818HC, H818HP, H818HPC, H818HPW, H819, H819HW, H820H, H820HC, H820HW, H821H, H821HC, H821HW, H822HW, H823, H823W, H823H, H823HW, H802G, H802W, H02G, H01C, H825, H825G, H825W, H826H, H826HW, H826HP, H826HPW, H827H, H827HW, H827S, H827SC, H827SW, H828H, H828HC, H828HW, H829, H830, H831H, H832, H833, H835, H836, H837, H838, H839, H850H, H851, H851SW, H851SPW, H852HW, H852HPW, H853H, H855HW, H856HW, H857HW, H857HPW, H858, H859H, H859HPW, H859HW, H860H, H860HW, H860SW, H860SPW, H861G, H862, H863HW, H865SW, H865SPW, H865SPW-Pro, H866HW, H866HPW, H867, H868, H869SW, H869SPW, H869SPW-Pro, H870SW, H870SPW, H871HW, H872SPW, H873, S90, NH525, 56814, NH530, LS233009, LSB01, LS233837, LS233856, LS233857, LS233854, LS233855, SKU56814, SKU59537, NH425, NH430, S80, S400, S450, S70, S350, S500, DRC445-NOC, DRC445KIT-NOC, DRC447-NOC, DRC447KIT-NOC, DRCLS16, DRC250-NOC, DRC251-NOC, DRC090-BLK, DRC090-SIL, DRCLSX10-NOC, DRCX4-NOC, H875, H896, H872, H878MAX,

H8166 GPS, H876 Max, H877, LSY240-243, SPEEDY83

Only the model H870SPW was tested, since according to the declaration from the applicant, the electrical circuit design, PCB layout, components used and internal wiring and functions were identical for the above models, with only difference being of product appearance color, shape, packaging and model No.

3.3 Separation Distance

Minimum test separation distance:	20cm
-----------------------------------	------

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 Co., Ltd., Shenzhen Branch

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Tel: +86 755 2601 2053 Fax: +86 755 2671 0594

No tests were sub-contracted.

3.5 Test Facility

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

A2LA (Certificate No. 3816.01)

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 3816.01.

VCCI (Member No. 1937)

The 3m Fully-anechoic chamber for above 1GHz, 10m Semi-anechoic chamber for below 1GHz, Shielded Room for Mains Port Conducted Interference Measurement and Telecommunication Port Conducted Interference Measurement of SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen EMC laboratory have been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: G-20026, R-14188, C-12383 and T-11153 respectively.

FCC –Designation Number: CN1336

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized as an accredited testing laboratory.

Designation Number: CN1336. Test Firm Registration Number: 787754.

Innovation, Science and Economic Development Canada

SGS-CSTC Standards Technical Services Co., Ltd., Shenzhen EMC Laboratory has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0006.

IC#: 4620C.

3.6 Deviation from Standards

None

Abnormalities from Standard Conditions 3.7 None



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FCC Radiofrequency radiation exposure limits 4

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

Blanket 1 mW Blanket Exemption 4.1

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.

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.

RF Source Frequency			Minimum Distance			Threshold ERP			
<i>f</i> ⊾ MHz		<i>f</i> ⊦ MHz	λ_ / 2π		λ _Η / 2π	W			
0.3	-	1.34	159 m	-	35.6 m	1,920 R ²			
1.34	-	30 35.6 m – 1.6 m		3,450 R²/f ²					
30	-	300	1.6 m – 159 mm		3.83 R ²				
300	– 1,500 159 mm		159 mm	-	31.8 mm	0.0128 R ² f			
1,500	1,500 – 100,000 31.8 mm – 0.5 mm 19.2R ²								
Subscripts L and H are low and high; λ is wavelength.									
From §1.1307(From §1.1307(b)(3)(i)(C), modified by adding Minimum Distance columns.								

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



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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.

For mobile devices that are not exempt per Table B.1 [Table 1 of \$1.1307(b)(1)(i)(C)] at distances from 20 cm to 40 cm and in 0.3 GHz to 6 GHz, evaluation of compliance with the exposure limits in \$1.1310 is necessary if the ERP of the device is greater than *ERP*_{20cm} in Formula (B.1) [repeated from \$2.1091(c)(1); also in \$1.1307(b)(1)(i)(B)].

$$P_{\rm th} (\rm mW) = ERP_{20 \,\rm cm} (\rm mW) = \begin{cases} 2040f & 0.3 \,\rm GHz \le f < 1.5 \,\rm GHz \\ \\ 3060 & 1.5 \,\rm GHz \le f \le 6 \,\rm GHz \end{cases}$$
(B.1)

If the ERP is not easily obtained, then the available maximum time-averaged power may be used (i.e., without consideration of ERP only 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.

SAR-based exemptions are constant at separation distances between 20 cm and 40 cm to avoid discontinuities in the threshold when transitioning between SAR-based and MPE-based exemption criteria at 40 cm, considering the importance of reflections.

Limit calculation								
Frequency range	Frequency(MHz)	R(λ/2π)(m)	Threshold ERP(W)					
300~1500MHz	915	0.0522	0.032					
1500~100000MHz	2480	0.0193	0.007					

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.



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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.



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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 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive). Pth is given by Formula (B.2).

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

where

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

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



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Example values shown in Table B.2 are for illustration only.

Table B.2—Example Power Thresholds (mW)										
Frequency		Distance(mm)								
(MHz)	5	10	15	20	25	30	35	40	45	50
300	39	65	88	110	129	148	166	184	201	217
450	22	44	67	89	112	135	158	180	203	226
835	9	25	44	66	90	116	145	175	207	240
1900	3	12	26	44	66	92	122	157	195	236
2450	3	10	22	38	59	83	111	143	179	219
3600	2	8	18	32	49	71	96	125	158	195
5800	1	6	14	25	40	58	80	106	136	169

Limit calculation								
Frequency range(GHz)	Frequency(GHz)	Х	Distance(cm)	Pth (mW)				
0.3~1.5	0.915	1.474	0.5	8.133				
1.5~6	2.48	1.905	0.5	2.717				



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5 Measurement and Calculation

Maximum transmit power 5.1

For 2.4G property:

The Antenna Gain: 1.97dBi

Test Mode	Test Channel	Maximum Field Strength (dBuv/m)	E.I.R.P (dBm)	E.I.R.P (mW)	
GFSK	2456MHz	81.44*	-13.79	0.04	

(*) Note:

The Maximum Field Strength is based on the RF Test Report SZCR240500173503.

Note: EIRP = pt × gt = (E×d)*2/30 (According to ANSI C63.10 Annex G.1)

where

pt is the transmitter output power in watts

gt is the numeric gain of the transmitting antenna (dimensionless)

E is the electric field strength in V/m

d is the measurement distance in meters (m)

 $V/m = 10^{(((dBuV/m) - 120) / 20)}$

For 5G WIFI:

The Power Data is based on the RF Test Report SZCR240500173504.

Antenna Gain: 2.58dBi

Output Power Into Antenna & RF Exposure Evaluation Distance:

Frequency [MHz]	Maximum Conducted Output Power [dBm]	Maximum EIRP [dBm]	Maximum EIRP (mW)
5300	16.82	19.40	87.10

Note: Refer to report No. SZCR240500173504 for EUT test Max Power Value.

The distance (4th column) calculated from the Fries transmission formula is far greater than 20 cm separation requirement.



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5.2 RF Exposure Calculation

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

For 2.4G property:

The Max EIRP is 0.04mW. The best case gain of the antenna is 1.97dBi.

	Evaluation method	Exempt Limit(mW)	Verdict
	Blanket 1 mW Blanket Exemption	1mW	N/A
	MPE-based Exemption(ERP)	7mW(ERP)	N/A
\square	SAR-based Exemption(P_{th})	3060	Yes

For 5G WIFI:

The Max EIRP is 87.10mW. The best case gain of the antenna is 2.58dBi.

	Evaluation method	Exempt Limit(mW)	Verdict
	Blanket 1 mW Blanket Exemption	1mW	N/A
	MPE-based Exemption(ERP)	7mW(ERP)	N/A
\boxtimes	SAR-based Exemption(<i>P</i> th)	3060	Yes

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

5.3 Simultaneous transmitting

 Σ rations of simultaneous transmitting: 2.4G property + 5G WIFI as the following table:

Ratio of EIRP power of 2.4G property	Ratio of EIRP power of 5G WIFI	Total ratios of simultaneous transmitting	Limit	Result
0.00001	0.0285	0.02851	1.0	PASS

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



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EUT Constructional Details (EUT Photos) 6

Refer to Appendix - Photographs of EUT Constructional Details for SZCR2405001735AT.

--End of the Report--



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