RF Exposure Report

Application No.:	FYCR2211000439ET (SGS SZ NO.: T52210330011EM)
Applicant:	LI XIONG SHENG TOYS FACTORY
Address of Applicant:	BEIWAN INDUSTRIAL AREA, LIANXIA TOWN, CHENGHAI DISTRICT, SHANTOU CITY, GUANGDONG PROVINCE, CHINA
Manufacturer:	LI XIONG SHENG TOYS FACTORY
Address of Manufacturer:	BEIWAN INDUSTRIAL AREA, LIANXIA TOWN, CHENGHAI DISTRICT, SHANTOU CITY, GUANGDONG PROVINCE, CHINA
Equipment Under Test (EUT):	
EUT Name:	TOY CAR
Item No.:	697A, 174, 175, 176, 177, 173A, 174A, 175A, 176A, 177A, 178, 179, 181, 182, 178A, 179A, 180A, 181A, 182A, 686, 687, 688, 689, 690, 686A, 687A, 688A, 689A, 690A, 274A, 275A, 276A, 277A, 278A, 288A, 311, 313, 315, 316, 634, 635, 636, 634A, 635A, 636A, 274A-1, 275A-2, 276A-3, 277A-1, 288A-3, 634-1, 635-2, 636-3, 634A-1, 635A-2, 636A-3, 173A-1, 174A-2, 175A-3, 176A-4, 177A-5, 178A-1, 179A-2, 180A-3, 181A-4, 182A-5, 686-1, 687-2, 688-3, 689-4, 690-5, 686A-1, 687A-2, 688A-3, 689A-4, 690A-5, 637, 638, 637A-1, 638A-2, 639 ♣
♣	Please refer to section 2 of this report which indicates which item was actually tested and which were electrically identical.
FCC ID:	2AMW3-697A
Country of Destination:	US
Requested Age Grading:	3+
Standard(s) :	FCC Rules 47 CFR §2.1093 KDB 447498 D04 interim General RF Exposure Guidance v01
Date of Receipt:	2022-11-04
Date of Test:	2022-11-08 to 2023-02-28
Date of Issue:	2023-03-01
Test Result:	**Pass***

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

Winkey Wang
EMC Technical Manager

Revision Record				
Version	**Chapter**	**Date**	**Modifier**	**Remark**
01		2023-03-01		Original

Authorized for issue by:				
		Tree Zhan **Tree Zhan/Project Engineer**		
		Winkey Wang **Winkey Wang/Reviewer**		

1 Contents

Page

2 General Information

2.1 Details of E.U.T.

Power supply:	3V DC(1.5V x 2 "AA" Size Batteries) for remote controller
Operation Frequency	27.145MHz
Modulation Type:	ASK
Antenna Type:	Integral Antenna

Declaration of EUT Family Grouping:

Item No.: 697A, 174, 175, 176, 177, 173A, 174A, 175A, 176A, 177A, 178, 179, 181, 182, 178A, 179A, 180A, 181A, 182A, 686, 687, 688, 689, 690, 686A, 687A, 688A, 689A, 690A, 274A, 275A, 276A, 277A, 278A, 288A, 311, 313, 315, 316, 634, 635, 636, 634A, 635A, 636A, 274A-1, 275A-2, 276A-3, 277A-1, 288A-3, 634-1, 635-2, 636-3, 634A-1, 635A-2, 636A-3, 173A-1, 174A-2, 175A-3, 176A-4, 177A-5, 178A-1, 179A-2, 180A-3, 181A-4, 182A-5, 686-1, 687-2, 688-3, 689-4, 690-5, 686A-1, 687A-2, 688A-3, 689A-4, 690A-5, 637, 638, 637A-1, 638A-2, 639

Only the item 697A was tested, since according to the declaration from the applicant, the electrical circuit design, layout, components used, internal wiring and functions were identical for the above items, with only difference on item No., color and decorations.

2.3 Separation Distance

Minimum test separation distance:	5mm
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.	

2.4 Evaluating Location

All tests were performed at:
Compliance Certification Services（Kunshan）Inc. Shenzhen branch.
Fuyong lab. Xinlong TechnoPark,Fengtang Road, Fuyong Subdistrict, Bao'an, Shenzhen, China
Tel: +86 755 8866 3988 Fax: +86 755 2671 0594
No tests were sub-contracted.

2.5 Facility

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

• **A2LA (Certificate No. 6606.01)**

Compliance Certification Services（Kunshan）Inc. Shenzhen branch is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 6606.01.

• **FCC –Designation Number: CN1322**

Compliance Certification Services（Kunshan）Inc. Shenzhen branch has been recognized as an accredited testing laboratory.

Designation Number: CN1322. Test Firm Registration Number: 718073

• **Innovation, Science and Economic Development Canada**

Compliance Certification Services（Kunshan）Inc. Shenzhen branch has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0129.
IC#: 28189.

3 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.

3.1 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.

3.2 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.

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^2
1.34	–	30	35.6 m	–	1.6 m	3,450 R^2/f^2
30	–	300	1.6 m	–	159 mm	3.83 R^2
300	–	1,500	159 mm	–	31.8 mm	0.0128 R^2f
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(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 λ/2π. 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.

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)].

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

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 λ/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	**433.92**	0.1101	0.067
1500~100000MHz	**2472**	0.0193	0.007

3.3 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 λ/4.

As for devices with antennas of length greater than λ/4 where the gain is not well defined, but always less than that of a half-wave dipole (length λ/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 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive). P_{th} is given by Formula (B.2).

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

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_{20cm} is per Formula (B.1).

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

Table B.2—Example Power Thresholds (mW)

Frequency (MHz)	Distance(mm)									
	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)	X	Distance(cm)	Pth (mW)
0.3~1.5	**433.92**	5.488	**0.5**	**0.001**
1.5~6	**2.48**	1.905	**0.5**	**2.717**

4 Measurement and Calculation

4.1 Maximum transmit power

The Power Data is based on the RF Test Report FYCR221100043902
The Max. power (including tune-up tolerance) is -32.79 dBm on the channel 0.027145GHz(*)
-32.79 dBm logarithmic terms convert to numeric result is nearly 0.000526 mW

Note: ERP = pt × gt = (E×d)*2/49.2 (According to ANSI C63.10 Annex G.2).
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)

4.2 RF Exposure Calculation

The Max. power (including tune-up tolerance) is -32.79 dBm on the channel 0.027145GHz(*)

-32.79 dBm logarithmic terms convert to numeric result is nearly 0.000526 mW

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

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

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

5 EUT Constructional Details (EUT Photos)

Refer to appendix - external and internal photos for FYCR2211000439ET

--End of the Report--

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