

# Maximum Permissible Exposure Report

For

**Apex Toys (Shenzhen)Co., Ltd.**

**A.Floor 4,A001 Building,Zhi Ji Industrial Park, No.92 KuiChong**

**Street,LongGang district, Shenzhen, China**

**FCC ID: 2ADSO-GD-90A**

**FCC Rule(s):** FCC 47CFR Part 1.1310

**Product Description:** ELF B

**Tested Model:** GD-90A

**Report No.:** HCT17JR304E-2

**Sample Receipt Date:** 2017-10-25

**Tested Date:** 2017-10-26 to 2017-11-18

**Issued Date:** 2017-11-20

**Tested By:** Jason Su / Engineer

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**Note: This test report is limited to the above client company and the product model only. It may not be duplicated without prior permitted by Shenzhen SEM Test Technology Co., Ltd.**

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## 1. GENERAL INFORMATION

### 1.1 Product Description for Equipment Under Test (EUT)

Client Information	
Applicant:	Apex Toys (Shenzhen)Co., Ltd.
Address of applicant:	A.Floor 4,A001 Building,Zhi Ji Industrial Park, No.92 KuiChong Street,LongGang district, Shenzhen, China
Manufacturer:	Apex Toys (Shenzhen)Co., Ltd.
Address of manufacturer:	A.Floor 4,A001 Building,Zhi Ji Industrial Park, No.92 KuiChong Street,LongGang district, Shenzhen, China

General Description of EUT	
Product Name:	ELF B
Trade Name:	APEX
Model No.:	GD-90A
Adding Model(s):	/
Rated Voltage:	3.7V by battery
Power Adapter Model:	/
Note: The test data is gathered from a production sample,provided by the manufacturer.	

Technical Characteristics of EUT	
Frequency Range:	2402-2479MHz
Max Output Power:	0.076dBm
Data Rate:	/
Modulation:	GFSK
Quantity of Channels:	78
Channel Separation:	1MHz
Antenna Type:	Whip antenna
Antenna Gain:	0dBi
Lowest Internal Frequency of EUT:	12MHz

### 1.2 Test Standards

The objective of the following report is used to demonstrate that EUT operated in a manner that ensures the public is not exposed to radio frequency energy levels in excess of the relative provisions of FCC 47CFR Part 1.1310

### 1.3 General Description of Test

Items	Description
EUT Frequency band	<input type="checkbox"/> FHSS: 2.400GHz ~ 2.483GHz <input type="checkbox"/> WLAN: 2.400GHz ~ 2.483GHz <input type="checkbox"/> WLAN: 5.150GHz ~ 5.250GHz <input type="checkbox"/> WLAN: 5.745GHz ~ 5.825GHz <input checked="" type="checkbox"/> Others: <u>2.400GHz ~ 2.483GHz</u>
Device category	<input type="checkbox"/> Portable (<20cm separation) <input type="checkbox"/> Mobile (>20cm separation) <input checked="" type="checkbox"/> Others <u>&gt;20cm separation</u>
Exposure classification	<input type="checkbox"/> Occupational/Controlled exposure ( $S = 5\text{mW/cm}^2$ ) <input checked="" type="checkbox"/> General Population/Uncontrolled exposure $(S=1\text{mW/cm}^2)$ <input type="checkbox"/> Others: _____
Antenna diversity	<input checked="" type="checkbox"/> Single antenna <input type="checkbox"/> Multiple antennas: <div style="margin-left: 100px;"> <input type="checkbox"/> Tx diversity  <input type="checkbox"/> Rx diversity  <input type="checkbox"/> Tx/Rx diversity           </div>
Max. output power	The total peak power 0.076dBm (0.001W)
Antenna gain (Max)	0 dBi (Numeric gain:1.0)
Evaluation applied	<input checked="" type="checkbox"/> MPE Evaluation <input type="checkbox"/> SAR Evaluation
<b>Note:</b> 1. The maximum output is 0.076dBm at 2402MHz (with 1.0numeric antenna gain.) 2. For mobile or fixed location transmitters, no SAR consideration applied. The minimum separation generally be used is at least 20 cm, even if the calculations indicate that the MPE distance would be lesser.	

## 1.4 Human Exposure Assessment Results

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm <sup>2</sup> )	Averaging time (minutes)
<b>(A) Limits for Occupational/Controlled Exposure</b>				
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>(B) Limits for General Population/Uncontrolled Exposure</b>				
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

### Calculation

$$\text{Given } E = \frac{\sqrt{30 \times P \times G}}{d} \quad \& \quad S = \frac{E^2}{3770}$$

Where  $E$  = Field Strength in Volts / meter

$P$  = Power in Watts

$G$  = Numeric antenna gain

$d$  = Distance in meters

$S$  = Power Density in milliwatts / square centimeter

Combining equations and re-arranging the terms to express the distance as a function of the remaining variables yields:

$$S = \frac{30 \times P \times G}{3770 d^2}$$

Changing to units of mW and cm, using:

$$P \text{ (mW)} = P \text{ (W)} / 1000 \text{ and}$$

$$d \text{ (cm)} = 100 * d \text{ (m)}$$

Yields

$$S = \frac{30 \times (P/1000) \times G}{3770 \times (d/100)^2} = 0.0796 \times \frac{P \times G}{d^2} \quad \text{Equation 1}$$

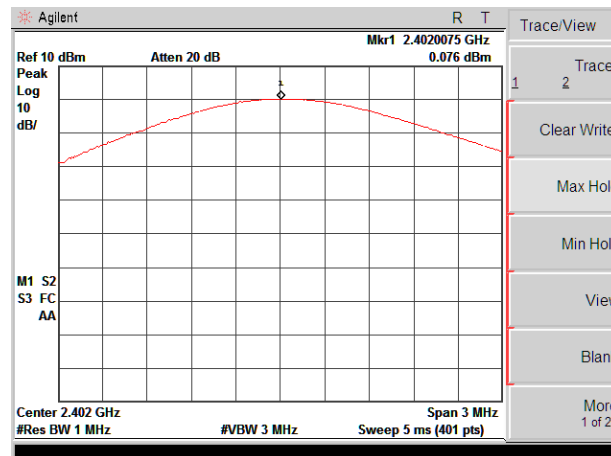
Where  $d$  = distance in cm

$P$  = Power in mW

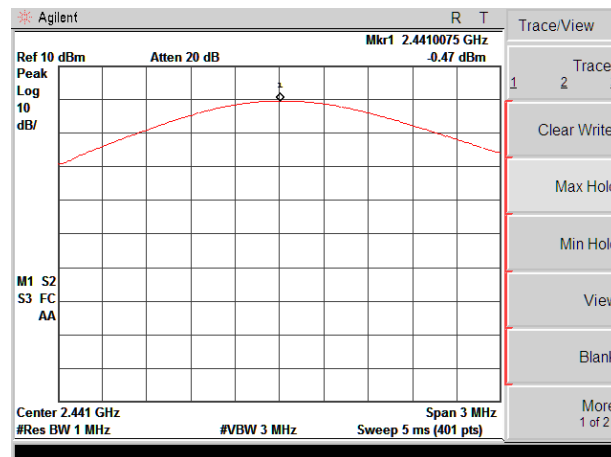
$G$  = Numeric antenna gain

$S$  = Power Density in mW / cm<sup>2</sup>

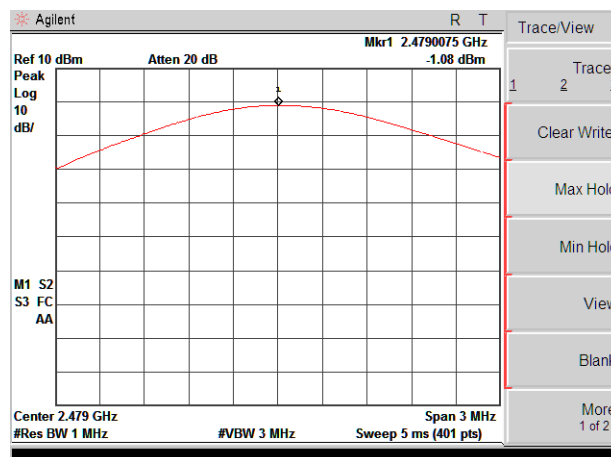
Peak output power: 2402MHz



Peak output power: 2441MHz



Peak output power: 2479MHz



<b><i>EUT parameter (data from the separate report)</i></b>	
Given $E = \frac{\sqrt{30 \times P \times G}}{d} \quad \& \quad S = \frac{E^2}{3770}$	Where G: numerical gain of transmitting antenna; TP: Transmitted power in watt; d: distance from the transmitting antenna in meter
Max average output power in Watt (TP)	0.076dBm (0.001W=1.0mW)
Antenna gain (G)	0dBi (Numeric gain:1.0)
Exposure classification	S=1mW/cm <sup>2</sup>
Minimum distance in meter (d) (from transmitting structure to the human body)	20cm (0.2m)
Yields $S = \frac{30 \times P \times G}{3770 d^2}, \quad P=0.001W=1.0mW, G=1.0, d=0.2m=20cm$ $S=0.00020mW/cm^2$	
Conclusion: S=0.00020mW/cm <sup>2</sup> is significant lower than the FCC 47CFR Part 1.1310 Limit 1mW/cm <sup>2</sup> . (For mobile or fixed location transmitters, the maximum power density is 1.0 mW / cm <sup>2</sup> even if the calculation indicates that the power density would be larger.)	