



RF EXPOSURE REPORT FOR FCC

RZBG(W) 20221009001-5

Applicant : UNICORN PRODUCTS LTD.

Address : South Barn, Crockham Park, Edenbridge, Kent TN8 6UP, ENGLAND

Product Name : Smartboard

Type/Model : 79700

FCC ID : 2A8Y9-79700

TEST RESULT : PASS

SUMMARY

The equipment complies with the requirements according to the following standard(s):

FCC KDB 447498 D04: Interim General RF Exposure Guidance v01

Date of issue: Nov. 17, 22

Prepared by

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Reviewed by:

Haohui Qiu (Reviewer)

Haohui Qiu





Content

SUMMARY	1
CONTENT	2
1. GENERAL INFORMATION OF EUT	3
1.1 Applicant information	3
1.2 Manufacture information	3
1.3 General description for equipment under test(EUT)	3
1.4 Technical information of equipment under test (EUT)	4
2. DESCRIPTION OF TEST FACILITY	5
3. SUMMARY OF TEST RESULT	6
3.1 Test standard	6
4. DEVICE CATEGORY AND LEVELS LIMITS	7
5. MPE ASSESSMENT	10
ANNEX A REVISION HISTORY	11



1. GENERAL INFORMATION OF EUT

1.1 Applicant information

Applicant	UNICORN PRODUCTS LTD.
Address	South Barn, Crockham Park, Edenbridge, Kent TN8 6UP, ENGLAND.
Contact person	Jianbin Fu
Phone number	18158180200

1.2 Manufacture information

Manufacture	Zhejiang Zhonghe Technology Co., Ltd.
Address	Room 303, Building 4, 413Tongyun Street, Liangzhu Street, Yuhang District, Hangzhou City, Zhejiang Province.

1.3 General description for equipment under test(EUT)

EUT name	Smartboard
Trade name	unicorn
Under test mode name	79700
Series model name	N/A
Description of different model name	N/A
Hardware version	V5.0-2022
Software version	V5.0-2022
Network and Wireless connectivity	BLE 5.1



1.4 Technical information of equipment under test (EUT)

Operate Freq. range	Frequency range (MHz)	Modulation	Channel bandwidth (MHz)	Date rate (Mbps)
BLE	2402-2480	GFSK	2	1
Maximum RF Output Power(dBm)	BLE:0.72			
FCC ID	2A8Y9-79700			
Equipment type	<input checked="" type="checkbox"/> Mobile <input type="checkbox"/> Portable <input type="checkbox"/> Fix Location			
About the Product	This Bluetooth is used for data transmission			
Antenna Type	PCB Antenna			
Antenna Gain	5.3 dBi			
Note:The antenna gain was declared by the Antenna report..				



2. DESCRIPTION OF TEST FACILITY

<input checked="" type="checkbox"/>	Company Name	Hangzhou TDT Technologies Co., Ltd.
	Address	Room 101, Building 3, No. 12, Binwen Road, Xixing Street, Binjiang district, Hangzhou, Zhejiang, China
	Telephone	+86571-88317620
	Telefax	+86571-88316350
	Test Location	Hangzhou TDT Technologies Co., Ltd.
	Address	Room 101, Building 3, No. 12, Binwen Road, Xixing Street, Binjiang district, Hangzhou, Zhejiang, China
	Telephone	+86571-88317620
	Telefax	+86571-88316350
	A2LA Certification number	4037.01
	CNAS Certification number	CNAS L7728
	VCCI Site registration number	C-14683, G-10832, R-14200, T-12223
	FCC Site registration number	645845

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3. SUMMARY OF TEST RESULT

3.1 Test standard

No.	Identify	Document title
1	47 CFR Part 15 Sub-part 2.1091	Radio frequency radiation exposure evaluation: mobile devices
2	FCC KDB 447498 D04	Interim General RF Exposure Guidance v01



4. DEVICE CATEGORY AND LEVELS LIMITS

According to FCC §§1.1307 and KDB 447498 D04, the available maximum time-averaged power or effective radiated power (ERP), whichever is greater, is less than or equal to the threshold P_{th} (mW).

The definition of the category as following:

1) Option A. 1-mW Test Exemption

Per § 1.1307(b)(3)(i)(A), a single RF source is exempt RF device (from the requirement to show data demonstrating compliance to RF exposure limits, as previously mentioned) if the available maximum time-averaged power is no more than 1 mW, regardless of separation distance.

This exemption applies to all operating configurations and exposure conditions, for the frequency range 100 kHz to 100 GHz, regardless of fixed, mobile, or portable device exposure conditions. This is a standalone exemption, and it cannot be applied in conjunction with any other test exemption.

2) Option B. SAR-Based Exemption

A more comprehensive exemption, considering a variable power threshold that depends on both the separation distance and power, is provided in § 1.1307(b)(3)(i)(B). This exemption is applicable to the frequency range between 300 MHz and 6 GHz, with test separation distances between 0.5 cm and 40 cm, and for all RF sources in fixed, mobile, and portable device exposure conditions.

Accordingly, a RF source is considered an RF exempt device if its available maximum time-averaged (matched conducted) power or its effective radiated power (ERP), whichever is greater, are below a specified threshold.

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_{th} is given by:

11/29/2021

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

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).

The 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

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

3) Option C MPE-Based Exemption

An alternative to the SAR-based exemption is provided in § 1.1307(b)(3)(i)(C), for a much wider frequency range, from 300 kHz to 100 GHz, applicable for separation distances greater or equal to $\lambda/2\pi$, where λ is the free-space operating wavelength in meters. The MPE-based test exemption condition is in terms of ERP, defined as the product of the maximum antenna gain and the delivered maximum time-averaged power. For this case, a RF source is an RF exempt device if its ERP (watts) is no more than a frequency-dependent value, as detailed tabular form in Appendix B. These limits have been derived based on the basic specifications on Maximum Permissible Exposure (MPE) considered for the FCC rules in § 1.1310(e)(1).

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
1.34	—	30	35.6 m	—	1.6 m
30	—	300	1.6 m	—	159 mm
300	—	1,500	159 mm	—	31.8 mm
1,500	—	100,000	31.8 mm	—	0.5 mm
		0			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.



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 according to Formula (C.1) [repeated from § 1.1307(b)(3)(ii)(B)].

$$\sum_{i=1}^a \frac{P_i}{P_{\text{th},i}} + \sum_{j=1}^b \frac{ERP_j}{ERP_{\text{th},j}} + \sum_{k=1}^c \frac{\text{Evaluated}_k}{\text{Exposure Limit}_k} \leq 1 \quad (\text{C. 1})$$

a number of fixed, mobile, or portable RF sources claiming exemption using the § 1.1307(b)(3)(i)(B) formula for P_{th} , including existing exempt transmitters and those being added.

b number of fixed, mobile, or portable RF sources claiming exemption using the applicable § 1.1307(b)(3)(i)(C) Table 1 formula 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.

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).

$P_{\text{th},i}$ the exemption threshold power (P_{th}) according to the § 1.1307(b)(3)(i)(B) formula for fixed, mobile, or portable RF source i .

ERP_j the available maximum time-averaged power or the ERP, whichever is greater, of fixed, mobile, or portable RF source j .

$ERP_{\text{th},j}$ exemption threshold ERP for fixed, mobile, or portable RF source j , at a distance of at least $\lambda/2\pi$, according to the applicable § 1.1307(b)(3)(i)(C) Table 1 formula at the location in question.

Evaluated_k 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.

Exposure Limit_k either the general population/uncontrolled maximum permissible exposure (MPE) or specific absorption rate (SAR) limit for each fixed, mobile, or portable sources, as applicable



5. MPE ASSESSMENT

Output power test data

Mode	BLE	
	Output power	
output power (dBm)	0.72	
Note: This report listed the worst case peak output power value, please refer to RF test report for more details.		

Assessment result

Evolution mode	Freq (MHz)	Maximum output power (dBm)	Antenna Gain (dBi)	EIRP (dBm)	Maximum ERP (dBm)	Distance (mm)	Maximum ERP (mw)	Threshold ERP Limit (mw)
BLE	2440	1	5.3	6.3	4.15	200	2.6	768

Conclusion:

RF exposure evaluation results: **Compliance**

Note:

1. Output power including tune up tolerance.
2. More power list please refer to RF test report.



Annex A Revision History

Version	Issue Date	Revisions Content
Rev.01	Nov.05.2022	Initial Issue

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