



RF EXPOSURE EVALUATION REPORT

APPLICANT : Shenzhen Xhorse Electronics Co., Ltd.
PRODUCT NAME : KEY READER
MODEL NAME : XDKR00
BRAND NAME : Xhorse
FCC ID : 2AI4T-XDKR00
STANDARD(S) : FCC 47CFR Part 2(2.1091)
RECEIPT DATE : 2021-08-18
TEST DATE : 2021-08-20 to 2021-09-14
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Edited by:

Zeng Xiaoying
Zeng Xiaoying (Rapporteur)

Approved by:

Shen Junsheng
Shen Junsheng (Supervisor)

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Change History		
Version	Date	Reason for change
1.0	2021-10-19	First edition



1. Technical Information

Note: Provide by applicant.

1.1 Applicant and Manufacturer Information

Applicant:	Shenzhen Xhorse Electronics Co., Ltd.
Applicant Address:	Floor 28, Block A, Building NO.6, international innovation Valley, Nanshan District, Shenzhen, China
Manufacturer:	Shenzhen Xhorse Electronics Co., Ltd.
Manufacturer Address:	Floor 28, Block A, Building NO.6, international innovation Valley, Nanshan District, Shenzhen, China

1.2 Equipment under Test (EUT) Description

Product Name:	KEY READER	
Sample No.:	1#	
Hardware Version:	V0.04	
Software Version:	V0.08	
Frequency Bands:	Bluetooth	2402MHz-2480MHz
	WLAN 2.4GHz	2412MHz-2462MHz
	WLAN 5GHz	5180MHz-5240MHz
		5745MHz-5825MHz
Modulation Mode:	Bluetooth	GFSK(1Mbps), $\pi/4$ -DQPSK(EDR 2Mbps), 8-DPSK(EDR 3Mbps)
	WLAN 2.4GHz	DSSS, OFDM
	WLAN 5GHz	OFDM
Antenna Type:	FPC Antenna	
Antenna Gain:	Bluetooth	1.8dBi
	WLAN 2.4GHz	1.8dBi
	WLAN 5GHz	2.4dBi



1.3 Applied Reference Documents

Leading reference documents for testing:

Identity	Document Title	Method Determination /Remark
FCC 47CFR Part 2(2.1091)	Radio Frequency Radiation Exposure Assessment: mobile devices	No deviation
KDB 447498 D01v06	General RF Exposure Guidance	No deviation

Note 1: Additions to, deviation, or exclusions from the method shall be judged in the "method determination" column of add, deviate or exclude from the specific method shall be explained in the "Remark" of the above table.

Note 2: When the test result is a critical value, we will use the measurement uncertainty give the judgment result based on the 95% confidence intervals.



2. Device Category and RF Exposure Limit

Per user manual, Based on 47CFR 2.1091, this device belongs to mobile device category with General Population/Uncontrolled exposure.

Mobile Devices:

47CFR 2.1091(b)

For purposes of this section, a mobile device is defined as a transmitting device designed to be used in other than fixed locations and to generally be used in such a way that a separation distance of at least 20 centimeters is normally maintained between the transmitter's radiating structure(s) and the body of the user or nearby persons. In this context, the term "fixed location" means that the device is physically secured at one location and is not able to be easily moved to another location. Transmitting devices designed to be used by consumers or workers that can be easily re-located, such as wireless devices associated with a personal computer, are considered to be mobile devices if they meet the 20 centimeter separation requirement.

General Population/Uncontrolled Exposure:

The general population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity. Warning labels placed on low-power consumer devices such as cellular telephones are not considered sufficient to allow the device to be considered under the occupational/controlled category, and the general population/uncontrolled exposure limits apply to these devices.

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 ²)	Averaging time (minutes)
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500	-	-	f/1500	30
1500-100,000	-	-	1.0	30

f = frequency in MHz* = Plane-wave equivalent power density



3. RF Output Power

Mode	Channel	Frequency (MHz)	Average Power (dBm)
			GFSK
Bluetooth LE	CH 00	2402	-1.76
	CH 19	2440	-1.69
	CH 39	2480	-1.89
Tune-up Limit			-1.00

Mode	Channel	Frequency (MHz)	Average Power (dBm)		
			GFSK	$\pi/4$ -DQPSK	8-DPSK
Bluetooth classic	CH 00	2402	11.78	8.76	8.72
	CH 39	2441	11.36	7.98	8.13
	CH 78	2480	12.03	8.97	8.96
Tune-up Limit			12.50	9.50	9.50

2.4GHz WLAN					
Mode	Channel	Frequency (MHz)	Average Power (dBm)	Tune-up Power	Duty Cycle %
802.11b	CH 1	2412	18.19	18.50	100.00
	CH 6	2442	18.15		
	CH 11	2462	18.03		
802.11g	CH 1	2412	17.29	17.50	100.00
	CH 6	2442	17.31	17.50	
	CH 11	2462	13.01	13.50	
802.11n (HT20)	CH 1	2412	16.07	16.50	100.00
	CH 6	2442	18.20	18.50	
	CH 11	2462	12.11	12.50	
802.11n (HT40)	CH 3	2422	10.12	10.50	100.00
	CH 6	2442	16.30	16.50	
	CH 9	2452	11.01	11.50	



5GHz WLAN, 5180MHz-5240MHz					
Mode	Channel	Frequency (MHz)	Average Power (dBm)	Tune-up Power	Duty Cycle %
802.11a	CH 36	5180	11.64	12.00	96.86
	CH 44	5220	15.19	15.50	
	CH 48	5240	15.29	15.50	
802.11n (HT20)	CH 36	5180	14.35	14.50	93.45
	CH 44	5220	14.29	14.50	
	CH 48	5240	14.52	15.00	
802.11n (HT40)	CH 38	5190	10.39	10.50	91.91
	CH 46	5230	14.53	15.00	
802.11ac (VHT20)	CH 36	5180	13.74	14.00	96.76
	CH 44	5220	13.76	14.00	
	CH 48	5240	13.92	14.50	
802.11ac (VHT40)	CH 38	5190	13.32	13.50	93.43
	CH 46	5230	13.60	14.00	
802.11ac (VHT80)	CH 42	5210	8.54	9.00	87.67



5GHz WLAN, 5745MHz-5825MHz					
Mode	Channel	Frequency (MHz)	Average Power (dBm)	Tune-up Power	Duty Cycle %
802.11a	CH 36	5180	16.49	17.00	96.86
	CH 44	5220	16.34	16.50	
	CH 48	5240	16.58	17.00	
802.11n (HT20)	CH 36	5180	16.02	16.50	93.45
	CH 44	5220	15.71	16.00	
	CH 48	5240	15.96	16.50	
802.11n (HT40)	CH 38	5190	15.91	16.50	91.91
	CH 46	5230	15.94	16.50	
802.11ac (VHT20)	CH 36	5180	15.40	16.00	96.76
	CH 44	5220	15.17	15.50	
	CH 48	5240	15.26	15.50	
802.11ac (VHT40)	CH 38	5190	14.85	15.50	93.43
	CH 46	5230	14.87	15.50	
802.11ac (VHT80)	CH 42	5210	14.68	15.00	87.67

Note 1: According to KDB 447498 Section 4.3, MPE assessment is based on source-based time-averaged maximum conducted output power of the RF channel requiring assessment, adjusted for tune-up tolerance, and the minimum test separation distance required for the exposure conditions.

Note 2: The output power refers to report (Report No.: SZ21070208W01/W02/W03/W04).

4. RF Exposure Assessment

➤ Standalone Transmission Assessment:

Bands	Frequency (MHz)	Tune-up Power(dBm)	Antenna Gain(dBi)	E.I.R.P. (mW)	Power Density (mW/cm ²)	Limit for MPE (mW/cm ²)
Bluetooth	2480	12.50	1.8	26.92	0.005	1.0
WLAN 2.4GHz	2442	18.50	1.8	107.15	0.021	1.0
WLAN 5GHz	5240	17.00	2.4	87.10	0.017	1.0

Note:

1. The WLAN 2.4G, WLAN 5G and Bluetooth transmitter share the same antenna, Therefore simultaneous transmission assessment is not required.
2. For 5GHz WLAN, only the worst case will be used for calculating the power density.
3. MPE calculate method

$$\text{Power Density} = \text{E.I.R.P.}/4\pi R^2$$

Where: E.I.R.P. = P+G

P = Output Power (dBm)

G = Antenna Gain (dBi)

R = Separation Distance (20cm)

➤ Simultaneous Transmission Assessment:

According to the user manual, both the WLAN and Bluetooth transmitters in the device cannot operate simultaneously, therefore simultaneous transmission analysis is not required.

➤ Conclusion:

According to 47 CFR §2.1091, this device complies with human exposure basic restrictions.



Annex A Testing Laboratory Information

1. Identification of the Responsible Testing Laboratory

Laboratory Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Laboratory Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China
Telephone:	+86 755 36698555
Facsimile:	+86 755 36698525

2. Identification of the Responsible Testing Location

Name:	Shenzhen Morlab Communications Technology Co., Ltd.
Address:	FL.3, Building A, FeiYang Science Park, No.8 LongChang Road, Block 67, BaoAn District, ShenZhen, GuangDong Province, P. R. China

3. Facilities and Accreditations

All measurement facilities used to collect the measurement data are located at FL.3, Building A, FeiYang Science Park, Block 67, BaoAn District, Shenzhen, 518101 P. R. China. The test site is constructed in conformance with the requirements of ANSI C63.10-2013 and CISPR Publication 22; the FCC designation number is CN1192, the test firm registration number is 226174.

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